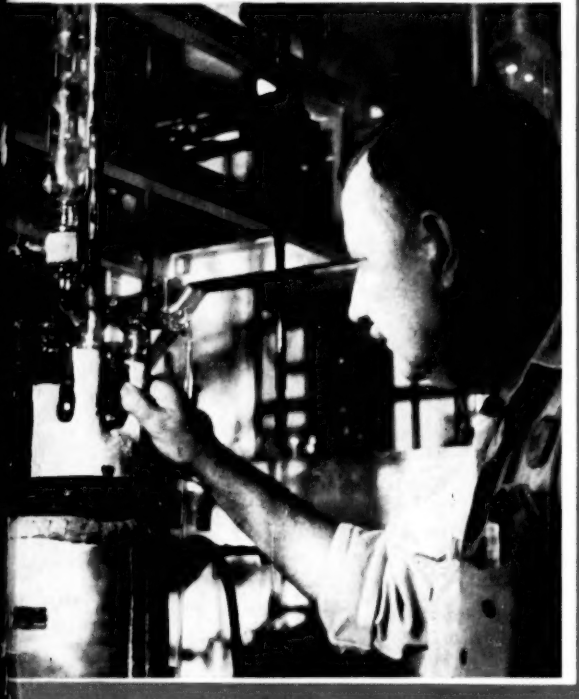
CW Report

Chemical Week

July 31, 1954 Price 35 cents



H. K. Nieuwenhuis tells which firms are contributing what to petrochemical boom . . . . p. 35

CW Camera photographs a trend: salt-free detergent sulfonates via sulfur trioxide . . . . . p. 48

Night-shift technician boosts lab efficiency, tends reactions while researchers sleep . . p. 52

Quick shift in quicksilver: new government buying program will bend price curve downward p. 67

Want to be a sales manager? Here's a dissection of his job, his backgrou[illegible]

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Chemical Week

Volume 7[illegible] July 31, 1954 Number 5

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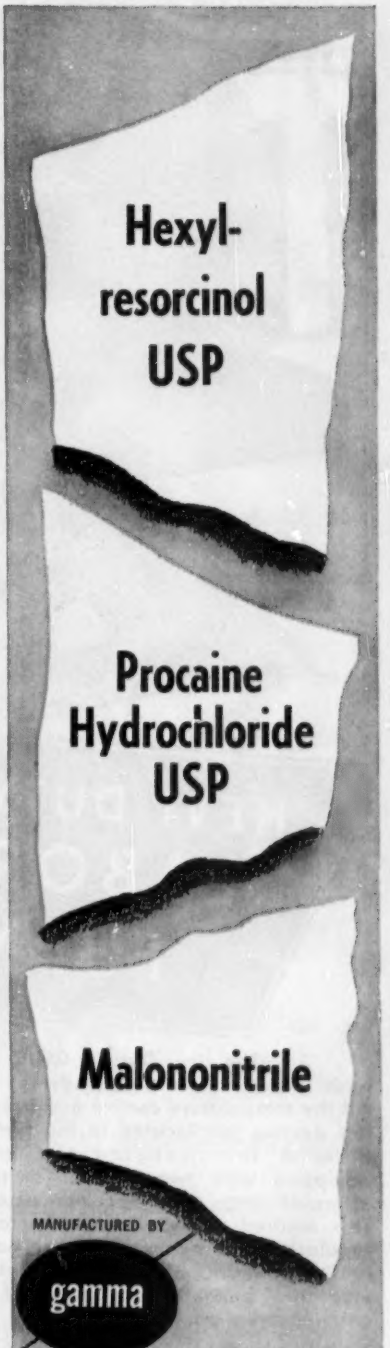

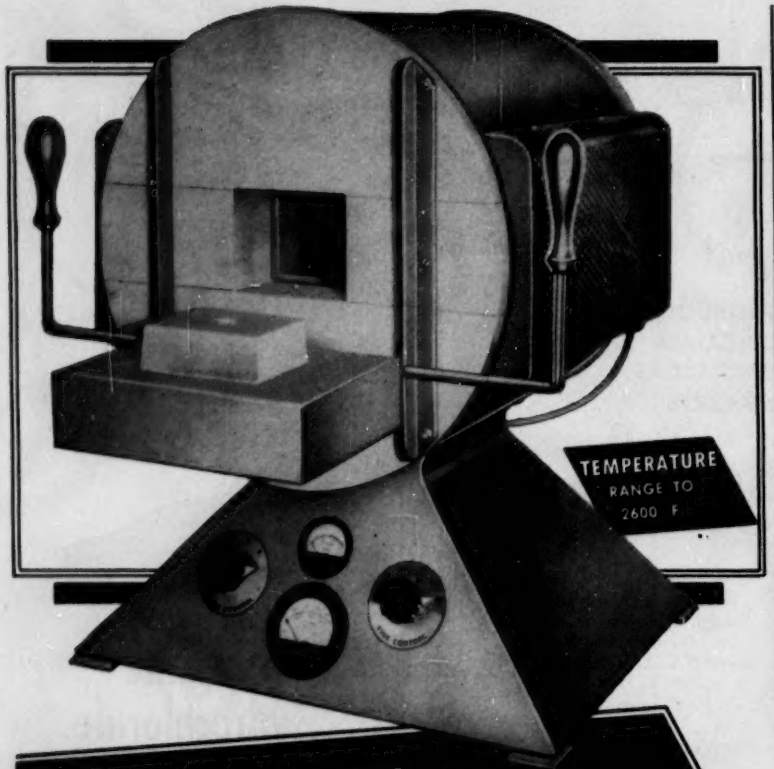

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OPINION . .

Latin-American Plant

To the Editor: . . . I depend very much on CW for keeping up to date in the fields you cover . . . I look forward to each issue and treasure the information I find therein . . .

I just finished reading your July 10 issue . . . and the very informative news article on Venezuela . . . but you do neglect to mention Parke, Davis . . . As I understand it, our plant is the finest in the pharmaceutical field in Caracas . . . I am enclosing a picture . . . I thought you might be interested . . .

Incidentally, we are at present constructing manufacturing laboratories in Manila, Chile and Bombay . . .

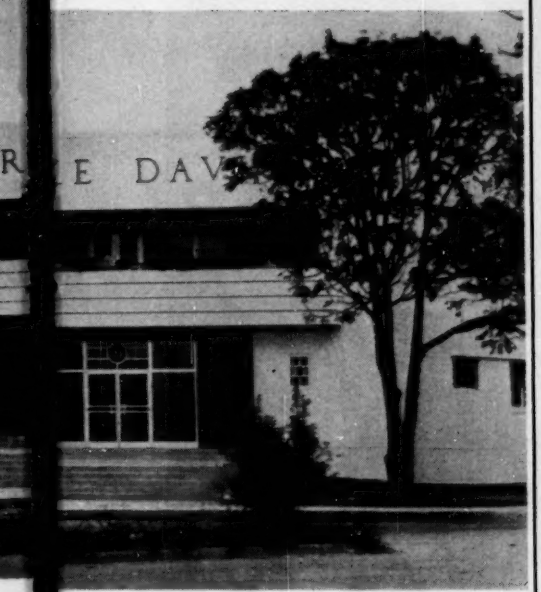
Harvey M. Merker
Director of Scientific Relations
Parke, Davis & Co.
Detroit

Thanks. Plant pictures didn't fit into the context of our piece on Venezuela, but we're glad to allocate space to this out-of-the-ordinary photo.—Ed.

National Aspirin?

To the Editor: . . . Your editorial on the Oppenheimer case, in which I notice that you carefully refrained from passing any judgment on the individual but, properly, I think, discussed the issue and the principle involved . . . makes me wonder if we are not following a path parallel to that of the Romans . . .

Whenever the state was in trouble



the Romans used to offer up a couple of individuals as "sacrifices" . . . that seemed to satisfy everyone (except, perhaps the individuals) . . .

Our state seems to be in a lot of trouble now . . . Perhaps what we are doing is Roman-like . . .

I feel that many of us, consciously or unconsciously, are worried about the A-bomb and all the problems it has thrust upon us . . . We are worried about the world prospects . . . We are worried by events which seem to overwhelm us . . .

The "sacrifice" of the prime developer of the A-bomb might, therefore, provide a happy solution . . . a "sacrifice" and a "burying of a worry" . . .

Perhaps the trial, and the verdict, are something of a national aspirin tablet . . .

R. S. RUTLEDGE
Minneapolis, Minn.

DATES AHEAD

American Pharmaceutical Assn., annual meeting, Statler hotel, Boston, Aug. 22-27.

World Congress on Surface Active Agents, Sorbonne, Paris, France, Aug. 30-Sept. 3.

National Agricultural Chemicals Assn., annual meeting, Essex and Sussex hotel, Spring Lake, N.J. Sept. 8-10.

International Congress of Industrial Chemistry, Brussels, Belgium, Sept. 11-19.

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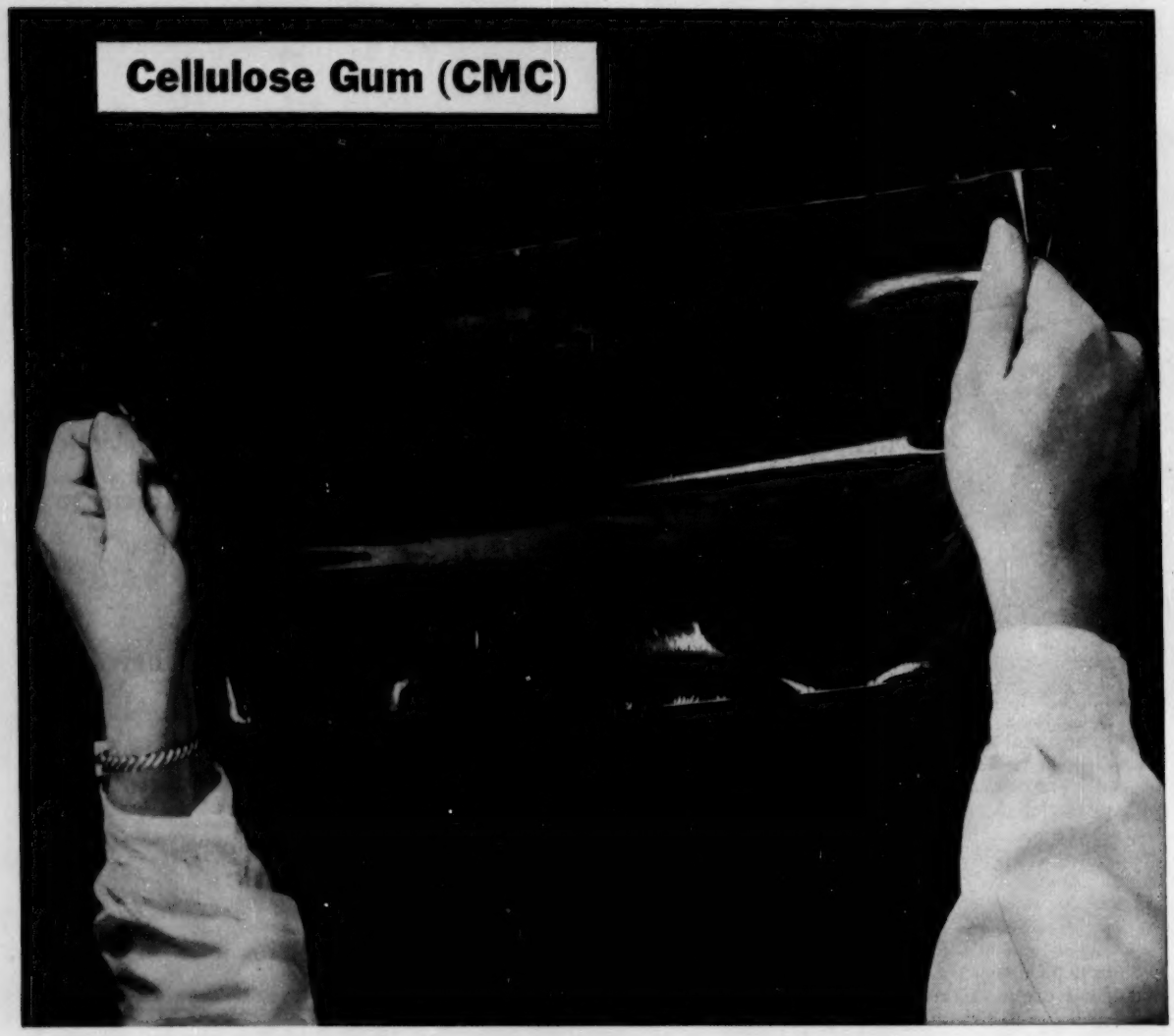

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CM54-6

Chemical Week
BUSINESS MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES

NEWSLETTER

Chemical process firms got a piece of the money loaned last week by the Small Business Administration:

- Sun Products Corp., Waco, Tex., manufacturers of liquid starch, $42,500 (bank participation).
- Daniel H. Jones Laboratories, Camden, N. J., manufacturers of fluosilicate specialties, $15,000 (direct).
- M. C. Boyle Phosphate Co., Chicago, $150,000 (bank participation).
- Turpentine Farmers Corp., Waycross, Ga., turpentine and rosin processing, $50,000 (bank participation).
- S. & E. Chemical Co., Chicago, industrial hand soap and cleaner manufacturers, $13,500 (direct).

•

There's more than meets the eye in Mallinckrodt Chemical's disclosure last week of a new, sensitive analysis for rare earths in steel. Fact is, Mallinckrodt is quietly working on rare earths development, hopes to build up a business selling them in commercial quantities to steelmakers (to use as alloying materials) and to others.

•

And there's a novel process twist in Atlantic Refining's new 100 tons/day ammonia plant at Philadelphia, onstream as of last week. Hydrogen comes from the gaseous effluent of a catalytic reformer. Hydrocarbons in the gas are frozen out at temperatures as low as —300 F, leaving pure hydrogen.

•

Monsanto's moving in three directions at once this week:

It will bring its scattered Inorganic Chemicals Division research (now at Everett, Mass., and Dayton, O.) together at Creve Coeur, Mo., just a few miles west of St. Louis. Construction of a research building will start soon.

Construction of a 400-tons/day contact sulfuric acid plant at Monsanto, Ill., has been undertaken.

As soon as some railroad tracks are removed from the site, it will start building a phosphoric acid and sodium tripolyphosphate plant at Kearny, N. J. Cost and capacity are still uncertain, but the firm thinks it will eventually be on the same order of size as the Trenton (Mich.) plant. Completion is expected by fall of next year.

•

Meanwhile, further ambitious plans are moving forward in Canada to utilize that country's natural gas and oil shale:

Northwest Nitro-Chemicals Ltd. is being formed to construct an $18-million plant in southern Alberta to make agricultural ammonia based on natural gas from New British Dominion Oil Co. Ltd. (Calgary), which has a substantial equity in the new firm.

Nashwaak Corp. of Canada Ltd. proposes a $7.5-million power development based on New Brunswick's oil shale deposits (and possibly a chemical project based on the alumina residue from the burnt shale). The provincial government is now taking a close look at the proposal, has retained Ebasco Services (New York) to evaluate it.

Two pertinent fast amortization certificates have just been granted by the Office of Defense Mobilization:

• Tennessee Eastman, Kingsport, Tenn., $2.6 million at 45 per cent for research and development facilities.

• Monsanto Chemical, Monsanto, Ill., $452,100 at 40 per cent for petrochemical storage facilities.

•

Patronage or civil service? This perennial problem was compromised this week when George Larrick, deputy commissioner of the Food & Drug Administration, was dubbed successor to retiring Commissioner Charles Crawford. Larrick has been with FDA since 1923.

That looks like a clear-cut victory for civil service, but here's the compromise: it appears likely that an appointee—from the drug industry—will be put over Larrick as assistant administrator of the Dept. of Health, Education & Welfare, FDA's parent agency.

•

Already up to its knees in the chemical business, W. R. Grace & Co. plunged thigh-deep last week by proposing to buy Dewey and Almy Chemical by means of a one-for-one exchange of stock shares.

The deal stems back to 1952, when Grace advanced working capital to D & A in exchange for five-year, 3½% notes—convertible into stock after Feb. '54 at the option of either party.

This acquisition, assuming it will be OK'd by stockholders of both firms, will add another block to Grace's chemical structure, which already includes Grace Chemical, Davison Chemical, Thurston Chemical and Naco Fertilizer.

•

Add another acquisition, formation, and expansion:

• Food Machinery & Chemical is buying the Fairfield, Md., plant owned by National Distillers' U.S.I. Division, will operate it as the Fairfield Chemical Division. National Distillers will transfer unrelated operations to other locations, and Food Machinery will continue the pesticides business—pyrenones, piperonyl butoxide, pyrethrum, allethrin, grain protectants and other chemicals.

• Sulphur Exploration Co. has been formed by several Houstonians, has leased 7,000 acres in Harris County, including 2,100 acres on Hockley Dome. Drilling will start as soon as the firm's stock has been sold.

• Allied Chemical & Dye's Nitrogen Division's $6-million plant at Orange, Tex., just completed last February is already underging a $1-million expansion—a unit to produce ethanolamines.

•

Victims of the 1947 Texas City ammonium nitrate explosion may still collect damages despite the U. S. Supreme Court's ruling that the government is not responsible. A resolution introduced by Rep. Clark Thompson (D., Tex.) has been approved by the House Rules Committee, will possibly be acted upon by the House this week. The resolution authorizes payment by the government of claims totaling $80-200 million.

•

Detergent huckstering is by no means an exclusively American phenomenon. In Britain, the chief contenders are Daz, made by a Procter & Gamble subsidiary, and its new rival, Omo, a Unilever product. A free sample of Omo, together with coupons, was sent to every household in Britain, and now Thomas Hedley, the P&G subsidiary, is offering to subscribe one penny to a designated charity for every box top it receives.

. . . The Editors

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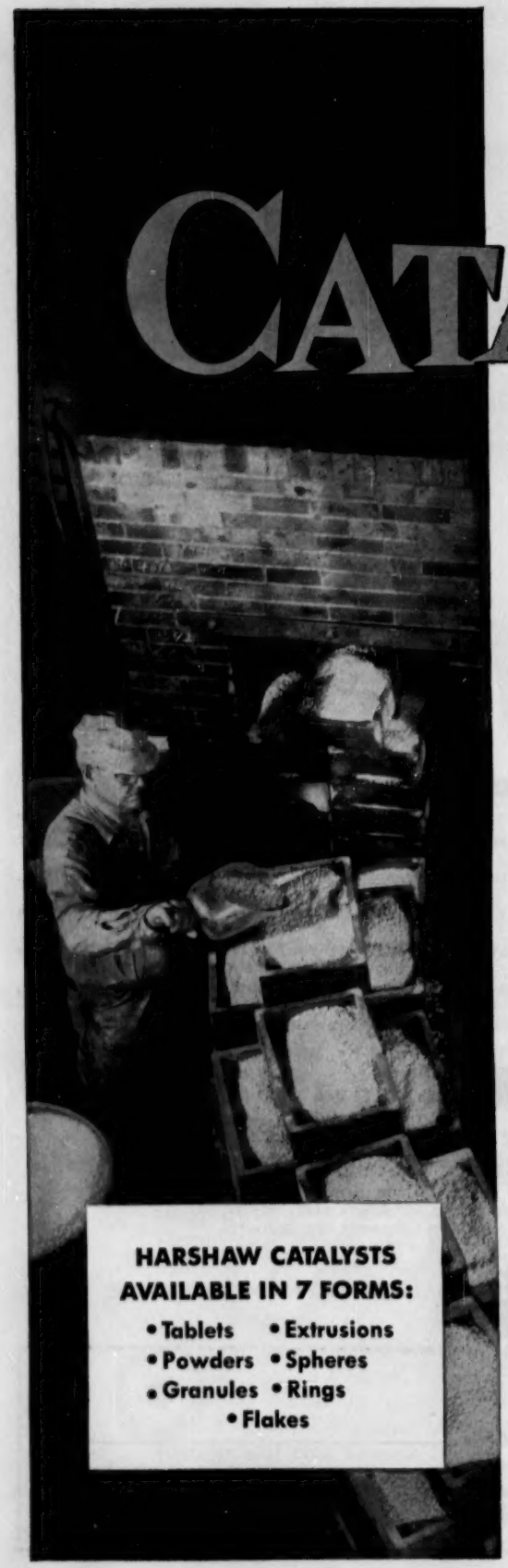

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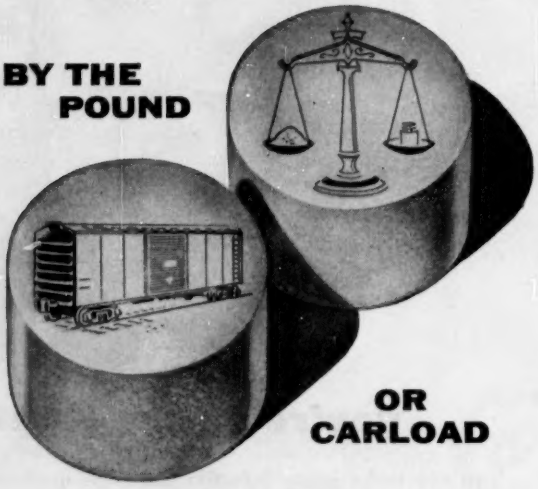

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HARSHAW

BUSINESS & INDUSTRY . . . .

Moving into Position

Concerned over the feverish uranium stock-selling spree in the Salt Lake City-Denver region, the Securities & Exchange Commission last week posted a close watch over sales of all penny uranium stocks in the area. Setting up a new office in Salt Lake City, and increasing the size of his Denver staff, Chairman Ralph H. Demmler says the commission deems it "of upmost importance to keep apprised of developments at close range." That is leading Washington observers to speculate that a federal crackdown is impending.

For the moment, however, the new SEC staff will simply check on compliance with registration requirements, and keep a sharp lookout for any and all fraudulent practices—whether they be by issuing companies, brokers, or dealers. Foremost regulation with which SEC will demand compliance: Regulation A, which allows issues under $300,000 to be exempted from SEC registration "only so long as the commission is notified of the offering and is provided with prescribed information."

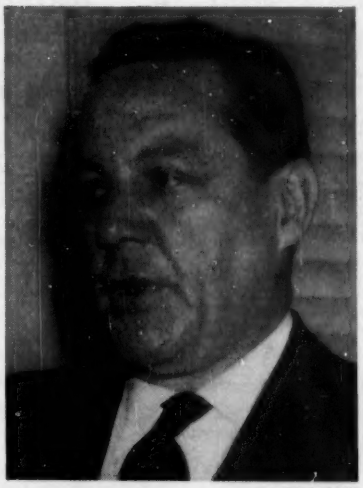
Checking on even such simple requirements may prove to be a major task, however. Some 46 filings were received in the Denver office alone last month—more than three times the monthly average this time last year. Representatives may be hard pressed to keep up with this pace. If so, SEC seems ready and eager to up its present manpower.

Rate Freeze, Rate Fight

Like schoolboys' voices, things are changing rapidly these days in the field of natural gas rates. Chemical and petrochemical companies that use gas as fuel, feedstock or both are keeping close tabs on developments this week, because whatever the federal government does may have a heavy impact on gas prices and availability throughout the country.

Latest developments:

• The Federal Power Commission clamped a price freeze on independent natural gas producers who sell to interstate pipeline firms, preparatory to spelling out its new regulatory procedure ordered by the U.S. Supreme Court in the Phillips case (*CW, June 19, p. 40*).



WIDE WORLD

FPC'S STUECK: For first time since 1932, a Republican majority.

• Two companies that lost out in FPC hearing on supplying natural gas to the Pacific Northwest (*CW, July 13, p. 13*) have asked for a stay on this decision.

• New FPC Commissioner Frederick Stueck* gives the Administration a Republican majority on the commission, with two Eisenhower appointees backing up a long-time GOP member. This gives the Republicans their first majority on the FPC since 1932.

• The Supreme Court has handed down its formal order on the Phillips case, clearing the way for FPC to go ahead and carry out the mandate to regulate independent producers' prices.

Democrat Dissents: The freeze on the selling price of natural gas at the wellhead in the gas fields is the first step in the commission's exercise of its newly defined authority to regulate all such prices in the booming natural gas industry. The price freeze affects some 4,100 producers and gatherers who are now ordered not to charge pipeline companies any more than the price in effect on June 7.

Lone Democrat on the commission, Seaborn Lee Digby, has protested this ruling on the ground that FPC has no authority to fix prices retroactively. Digby favors separate treatment of two categories of gas producers: the 61 companies that—according to Digby—"are responsible for about 80% of all gas sold in interstate commerce," and the small producers, who account for the remaining 20%.

Still pending before the Supreme Court is the appeal by Phillips and the states of Texas, Oklahoma and New Mexico for a rehearing of the case decided last June; but it's very seldom that the high court consents to such a rehearing.

Another Long Shot: Westcoast Transmission Co. and Trans-Northwest Gas., Inc.—companies that sought to bring Canadian natural gas into the U.S. to serve industrial and other customers in the booming Pacific Northwest—are urging FPC to reopen its hearings that led to a decision in favor of the Pacific Northwest Pipe Line Co., which will draw its gas from the San Juan Basin in New Mexico. It's generally believed that such an appeal is a very long shot. Westcoast Transmission, however, has already said it will go into the federal courts if FPC turns down the request.

Since Commissioner Stueck gives FPC a solid Republican complexion jibing with the Administration's own views on public power and governmental regulation, FPC can be expected to do all it can to keep from interfering with normal industrial development.

*Former St. Louis attorney, who chairmanned the Missouri Public Service Commission from 1941 to 1943.

Geneva Parley

Pointing toward the upcoming conference of the United Nations Economic Commission for Europe in Geneva next October, European chemical makers are rallying behind the cry for freer East-West trade. That's the current attitude from Bonn to London as Gunnar Myrdal of Sweden, executive secretary of the commission, last week formally convened the trade committee to plan for its member nations' conference scheduled to begin Oct. 11.

All European governments and the United States have been invited to attend. Subject of discussion: the possibility of revival of East-West trade.

Last meeting of the committee, five years ago, ended in a deadlock over the inability of the East and West to agree on the products to be traded. But this time, Myrdal maintains,

there's a different tenor of sentiment emanating from behind the Iron Curtain. The current Soviet position seems to be to woo West Germany and continental trade away from U.S.-dominated areas. Red-controlled countries, sorely in need of Western-produced commodities (among them prominently fertilizers, pharmaceuticals, organic chemicals), have apparently been given the green light as far as drafting trade pacts with Western nations is concerned.

And adding to the chance of more East-West deals: most European countries (notably Germany, with all types of chemicals; France, with surpluses of alcohol and petrochemicals; Italy, with excesses of fertilizers and pharmaceuticals) are currently faced with a serious overproduction problem. Chemical producers have been eyeing the potential of the Russian market for many months, demanding governmental pressure on the United Nations (and indirectly on the U.S.) for a major relaxation of restrictions.

What position the U.S. will take, however, is still open to conjecture. Supposedly, the Eisenhower Administration is backing a gradual relaxation policy and would accede to small concessions re the type of products that may be considered as strategic. It would rebuff any general jettisoning of restrictions.

But any such one-step-now action won't satisfy European chemical producers now. They've scented the chance to band together in a consolidated drive to force the U.S. to give ground on its trade-barring policy. That spells trouble in Geneva next October.

WIDE WORLD

SWEDEN'S MYRDAL: Host to an incendiary session.

United States of America
National Labor Relations Board
SAMPLE
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OFFICIAL SECRET BALLOT
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This ballot is to determine the collective bargaining representative, if any, for the unit in which you are employed.
If you spoil this ballot return it to the Board Agent for a new one.

MARK AN "X" IN THE SQUARE OF YOUR CHOICE

1. Do you wish to be included with laboratory technicians and the laboratory maintenance mechanic in a single unit for the purpose of collective bargaining.

7 YES ____ NO ____ 7

2. Do you wish to be represented for purposes of collective bargaining by -

OIL WORKERS INTERNATIONAL UNION, CIO

6 YES ____ NO ____ 8

DO NOT SIGN THIS BALLOT. Fold and drop in ballot box.

CHEMISTS' BALLOT: Among lab men, uncertainty as to union's pro's and con's.

Hairline Verdict

It may be only a passing fad, never to become an established practice, but here and there a few professional employees in the chemical industry occasionally get the yen to join labor unions and indulge in collective bargaining.

Latest instance of this break from tradition is at Witco Chemical's plant in Argo, Ill., where the National Labor Relations Board is checking this week on a single challenged ballot in an election in which 14 scientific employees—not including Ph.D.'s—and 13 technical assistants voted on whether to join the union that represents the production and maintenance workers there.

It's definite that the scientists won't be included in the mass bargaining unit, and—depending on the decision about that one challenged ballot—it's probable that the technical people also will stay out of Local 507, Oil Workers International Union (CIO). The scientists' voting is indicated on the sample ballot pictured above; voting by technicians, who used a one-question ballot OWIU representation, so far stands at six to six.

How does such a unionization move get started? In the Witco case—which may not be typical—some of the lab employees began talking "union" following a research program re-evaluation that the company explained was needed because there hadn't been satisfactory progress along certain lines of endeavor. Layoffs, a Witco spokesman adds, were based on specialized abilities, not on seniority.

To set out its view, the company sent letters to all lab employees stating that professional and highly skilled personnel don't need union representation. The employees' organizing committee argued that professional people have lost ground on prestige and economic position relative to gains made by unionized men.

The nearly even balloting indicates that in this case, the lab employees weren't quite certain as to which advice to follow. In such a small group, personalities no doubt loomed large. An isolated instance doesn't mirror a trend; but labor unions—never averse to garnering a few more members—can be expected to watch for and capitalize on any signs of unrest among professional employees.

Here's How the New Tax Changes Will Look to Company Treasurers

DIVIDENDS

Allows deduction of $50 in dividends from taxable income and provides for a credit against final tax of 2% of dividends in excess of $50 for 1954 and 4% in years after 1954.

FASTER AMORTIZATION

Increased deductions allowed for plant and equipment bought after Dec 31, '53. Gives tax benefits and incentives to purchase of all new productive facilities. Biggest single aid to business expansion: permits writing off two-thirds the cost in half the useful life.

DEPLETION ALLOWANCE

Increased allowance made to producers of 20-odd minerals including titanium, zinc, tungsten, nickel, cobalt, bauxite, graphite, ilmenite, sodium chloride.

LESS CARRYBACK

Liberalizes tax rebates by permitting carryback of losses over two preceding tax years, instead of one year under existing law.

PATENT INCOME

Inventors either professional or amateur get capital gains treatment of income from exclusive licensing of patent or patent application; similarly, capital gains tax treatment applies to those purchasing equity in such inventions.

INTANGIBLE DRILLING COSTS

Increases the deduction for exploration expenditures to $100,000 from $75,000, a new tax incentive to oil producers.

SURPLUS ACCUMULATION

Puts on tax collectors the burden of proving that undistributed earnings are unreasonable. Heretofore, taxpayer had to prove reasonableness of his reserves.

PAY-AS-YOU-GO

Corporations will pay 50% of 1954 tax liability in March '55; Remaining 50% in June '55. In Sept. '55 companies will pay 5% of estimated tax on 1955 income, and another 5% in December. Such payments will be stepped up in next four years so that companies will eventually pay 50% of estimated tax during third and fourth calendar quarters of the year.

CORPORATE TAX RATE

Continued at 52% until April 1, '55 when rate drops to 47%.

CONSOLIDATED RETURNS

Liberalizes tax treatment of companies controlling a number of incorporated subsidiaries.

INDUSTRIAL DEVELOPMENT CORPORATIONS

Killed Senate's provision to give additional break to semipublic development companies organized to bring new industry into local areas.

FOREIGN INCOME

Killed House provision making 14% of income from foreign sources tax free.

TAX-EXEMPT FOUNDATIONS

Killed Senate provision that would have removed tax-exempt status from nonprofit foundations making grants to subversives.

They'll Make a Difference

Like reaction to any major policy change, the chemical industries sentiments concerning the new tax bill, reported out of a joint House-Senate Conference Committee last week, is highly personalized. It all depends on which side of the fence anyone happens to be.

But one impression is common among management men everywhere. Substantial relief will be accorded particular companies—especially those that can profit from the greatly liberalized depreciation allowances now made. Also due for a break: partnerships—some of which will now be permitted to be taxed as corporations.

Particularly important to chemical firms in general, will be the new depreciation methods with respect to construction started before Jan. 1, '54. A last-minute change, the conference regulation adopts the earlier Senate provision concerning liberalization, but pushes up the effective date under which companies can claim the new rates—from "any construction completed after Dec. 31, '53" to "any portion of construction *carried on* after Jan. 1, '54."

Accepted virtually without change were the Senate provisions affecting "pay as you go" for large corporations, surplus accumulation, net operating loss carry-over; acquisition of loss-corporations, depletion and mine exploration expenditures, coal and timber income, intangible drilling costs, foreign tax credits, bond discounts and amortization of bond premiums.

But the joint committee made a slight change in the Senate provision giving capital gains treatment to inventors and persons who provide financial aid to inventors. The Senate version had restricted capital gains treatment only to the proceeds of a patented invention. The joint committee felt the relief was too selective, therefore unfair, Its proviso will make the capital gains allowance available also to the sale of rights under patent applications—even though no patent has yet been obtained. "That break,"

admits one chemical executive, "could mean manna from heaven to many companies in the chemical process industries."

The conferees adopted—with only five exceptions—the Senate version of provisions dealing with corporate reorganizations, liquidations, and other property distributions. Biggest switch: corporations in the process of liquidation during 1954 can make certain sales without having to report gain or loss if the distribution of the corporation's assets is completed within 12 months from the date of any liquidation plan adopted before June 22, '54.

Another change affects spin-offs, split-ups and other diverse reorganizational changes. The Senate bill had provided that such changes will be considered tax-free if, among other limitations, the transaction was not used primarily as a dodge for the distribution of earnings and profits. The conference committee nailed down the government interpretation of what will not be considered a "dodge," states that the mere sale of stock received in a distribution resulting from one of these reorganizations is not in itself to be treated as a "device for the distribution of earnings and profits if the sale is not part of the plan."

COMPANIES . . .

Morwhite Chemical Sales Corp., New York City, has filed articles with the secretary of state, in Albany, changing its name to Norward Chemical Co., Inc.

•

Barium & Chemicals Inc. has acquired a 200-acre site in Willoughby, O., where it intends to build a $3.5-million plant—including office buildings, a research laboratory, processing buildings, and a warehouse.

•

The Scott Paper Co. has entered into an agreement to acquire all of assets of the Detroit Sulphite Pulp and Paper Co. in exchange for 125,092 shares of Scott Paper common stock. This is on a basis of three common shares of Scott for five shares of the Detroit company.

•

Arthur D. Little, Inc.'s contract to develop industrialization in Egypt has been extended to June '56. Under direction of the U.S. Foreign Operations Administration, working from Cairo headquarters since 1953, the consultant firm has outlined 30 economically promising projects for Egypt—a number of them chemical.

In signing the extension agreement, Hassan Marci, Egyptian Minister of Commerce and Industry, stated that Egypt is gradually developing from a principally agricultural economy into a modern industrial nation.

EXPANSION . . .

Pulp: According to reports from Edmonton, Alberta, St. Regis Paper Co., North Canadian Oil, Ltd., and North Western Pulp and Power Co. will build a $30-million plant in Edson.

•

Catalysts: The Girdler Co., Louisville, Ky., has started construction of an addition to its catalyst plant, scheduled for completion late this year. Girdler began the manufacture of catalysts in 1942 as an outgrowth of the activities of its Gas Process Div.

•

Maleic Anhydride: The second unit of National Aniline's plant at Moundsville, W. Va., has started up. It's designed to produce maleic anhydride tablets and fumaric acid crystals. Output will be slated chiefly for sale to resin producers.

•

Cellulose Pulp: Buckeye Cellulose Corp. (a subsidiary of Procter & Gamble Co.) has opened its $25-million cellulose pulp plant at Foley, Fla. The plant, located 55 miles southeast of Tallahassee, on a 55-acre site, can turn out 300 tons/day of pulp—more than double Buckeye's present capacity.

•

Alum Liquor: Consolidated Chemical Industries, Inc. has broken ground at its plant on the Houston Ship Channel for an alum liquor plant. Completion's scheduled for the fall. Raw materials will be supplied by Consolidated's adjacent sulfuric acid plant, and the company's bauxite mines in Little Rock, Ark. The company is doing its own engineering and design work on the new facilities; contracts for construction work will be handled through a series of subcontracts.

•

Titanium Dioxide: Glidden Co. has started construction of the first unit of its proposed titanium dioxide-sulfuric acid plant facing on the Patapsco River, Baltimore. Cost of the first unit: $10 million—with two more units to follow. The new installation will be directly across the river from Glidden's current titanium dioxide plant.

Nylon Workers, After Hours

CLEARING THE BRUSH for their softball diamond and picnic grove are these husky members of the newly organized Chemstrand Employees Recreation Assn. at their company's big new nylon plant near Pensacola, Fla. The corporation is lending heavy equipment for this project, which is being built on part of the 2,000-acre site along the Escambia River. Chemstrand also donated $500 to the association's treasury. Later on, the group plans to build a children's playground, a fishing camp, and a clubhouse. First social function of the association was a watermelon feast for members and families.

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1

MONOMETHYLAMINE CH_3NH_2

Uses

Manufacture of amide and sulfonated amide-type detergents and surfactants. Synthesis of caffeine, aminophylline and desoxyephedrine. Manufacture of photographic chemicals, the explosive tetryl, amide-type plasticizers, ion-exchange resins, corrosion inhibitors and paint removers.

Properties

Molecular Weight	31.06	
Boiling Point at 760mm, °C	– 6.79	
Flash Point, Tag Open Cup, °F	34	(30% sol)
Density at 20°C	0.912	(30% sol)
Weight per U.S. Gallon at 68°F, lbs.	7.6	(30% sol)

2

DIMETHYLAMINE $(CH_3)_2NH$

Uses

Raw material in manufacture of thiuram sulfide-type vulcanization accelerators and of dimethyldithiocarbamic acid salts used as fungicides. Neutralizing and solubilizing agent in preparation of concentrated solutions of 2,4-D salts. Manufacture of anti-malarials.

Properties

Molecular Weight	45.08	
Boiling Point at 760mm, °C	6.88	
Flash Point, Tag Open Cup, °F	54	(25% sol)
Density at 20°C	0.921	(25% sol)
Weight per U.S. Gallon at 68°F, lbs.	7.7	(25% sol)

3

TRIMETHYLAMINE $(CH_3)_3N$

Uses

Preparation of long-chain quaternary ammonium compounds used as softeners, lubricants and waterproofing agents for textiles. Used with benzoyl peroxide to "set" methacrylate resins. Synthesis of cationic surface-active agents.

Properties

Molecular Weight	59.11	
Boiling Point at 760mm, °C	2.87	
Flash Point, Tag Open Cup, °F	38	(25% sol)
Density at 20°C	0.913	(25% sol)
Weight per U.S. Gallon at 68°F, lbs.	7.6	(25% sol)

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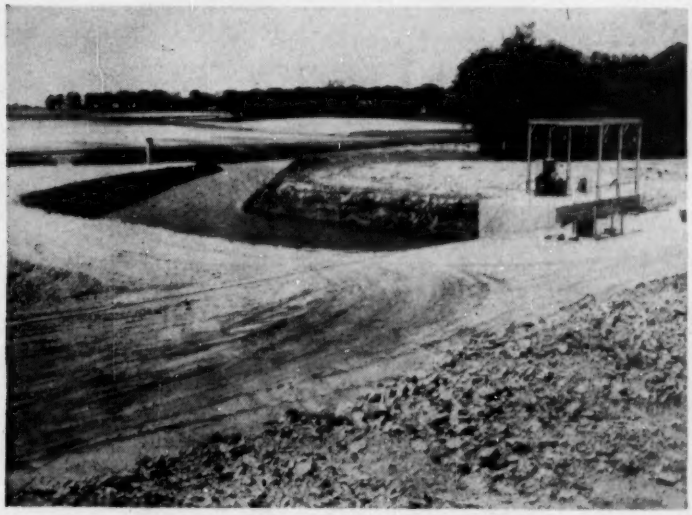

ALL PHOTOS—PETTITT

NEW, PEACE-MAKING water system—starting with diversion ditch, intake accelerator—helped National Petro-Chem in . . .

Dislodging a Delusion

This week, following completion of a $1,650,000 pollution control plant, water in the runt-size Kaskaskia River is running cleaner and clearer downstream from the National Petro-Chemicals plant at Tuscola, Ill., than it is upstream; and as a result, the company has won back the community friendship that flowered when the plant opened last fall.

But only four months ago, because of a string of bad breaks, it seemed that this $50-million plant didn't have a friend in the world. Consider how these incidents would jar a new chemical plant's community relations in an area of farms and small towns:

• Some 10,000 gal. of spent muriatic acid—which was supposed to be completely neutralized, then gradually drained away so as not to upset the stream's chloride content—was all dumped into the river by careless workmen last Nov. 10, only partly neutralized.

• Because of record drought conditions—lowest rainfall in 70 years—plant effluent received as little as one-to-one dilution in the Kaskaskia, and conventional lime treatment of sulfuric acid wastes boosted the river's sulfate content above the desired 250 ppm. maximum.

• Some of this accidentally polluted water spread from the temporary drainage ditch, and a few cattle in that area died.*

• By Feb. 24, the sluggish Kaskaskia (rate of flow just 1½ miles/day) had brought the twice-tainted water down near Shelbyville, where it was caught by a dam and held long enough to cause a notable fish kill.

Seepage and Suspicion: Before National went onstream, it had been assured that Shelbyville and other towns in that vicinity got their water from wells not connected with the Kaskaskia. But shortly after the big fish kill, Shelbyville officials suddenly

* No one saw the cattle drink that water, and the autopsies didn't prove that they had, but National promptly paid the farmers' claims anyway.

PURER WATER than at intake, with as much oxygen as any trout stream, returns to river via waste accelerator, aeration pit.

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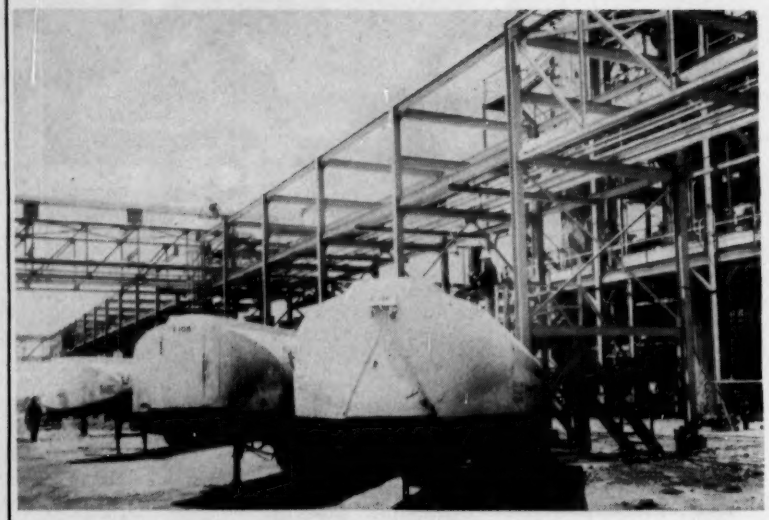


SPENT CAUSTIC never enters effluent system, is hauled away in tank trucks.

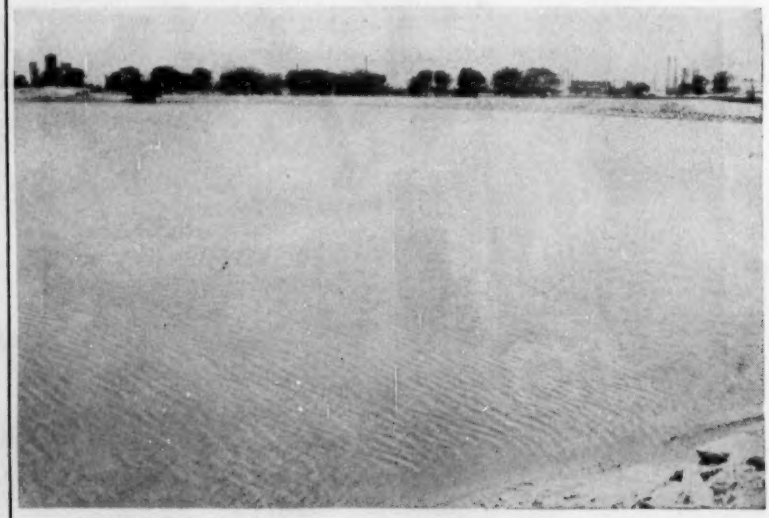
declared that polluted water from that river was seeping into their wells.

Apparently thoroughly convinced that National was to blame for their water's taste and odor, some 1,000 residents of the Shelbyville area stormed Springfield, the state capital, on March 25.

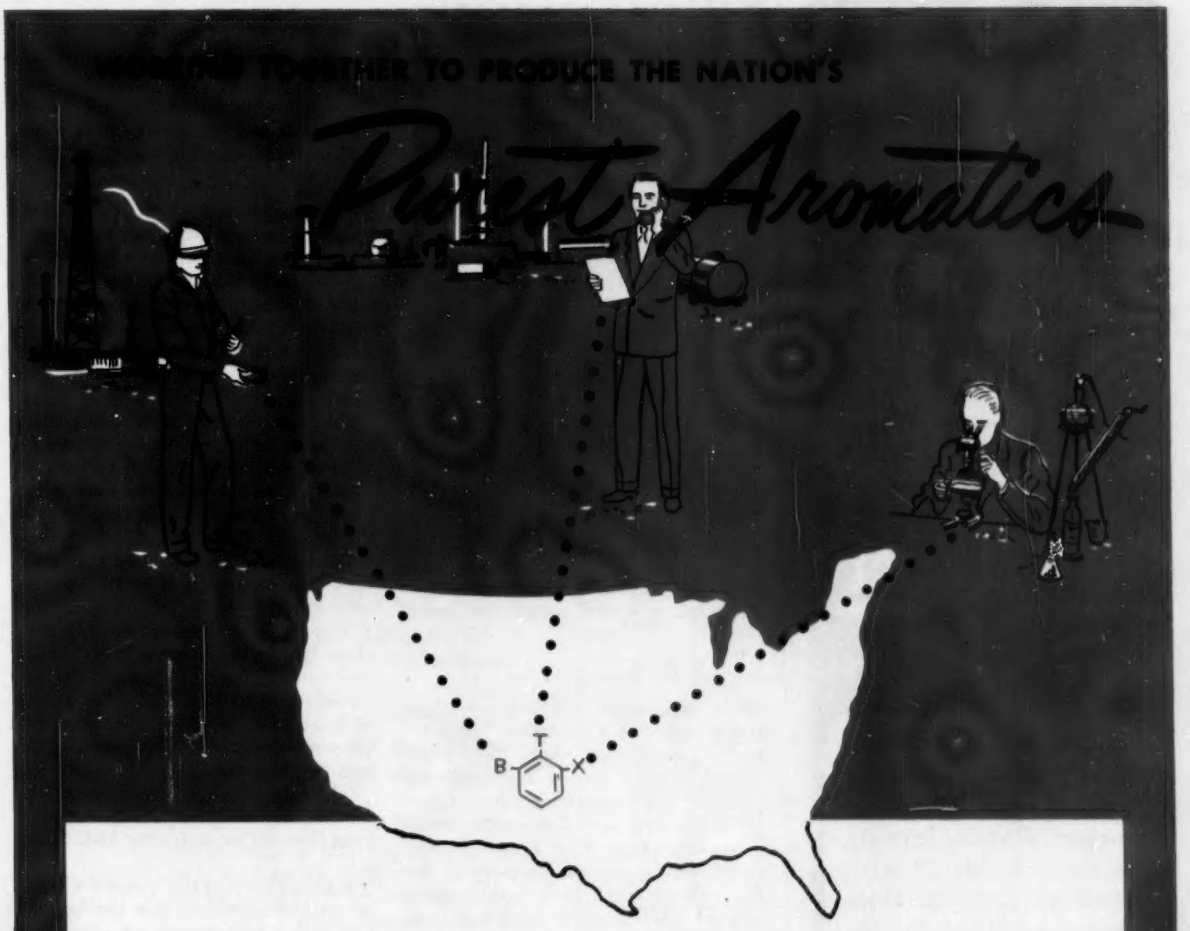
Actually, state water board chemists explained that the only objection to National's effluent last winter and spring was that the dissolved oxygen content was nearly zero. It was for this reason alone that the board obtained a temporary injunction against National on March 21; the company was enjoined from dumping any "polluting" wastes.

Fit for Trout: Since then, the water board has been able to detect no evidence of pollution. National's new waste treatment facilities, helped by an additional $150,000 aeration-chlorination unit, raise the dissolved oxygen content to 3-5 ppm.—equivalent to a quick, clear trout stream in the Rockies.

Shelbyville's well-publicized plaints helped to foster the idea that National's operations were contaminating all the water supplies for miles around. Barely onstream at the time, National held its ground, went to great expense to purify its effluent, and now has dislodged that delusion from the minds of most of its neighbors. It achieved this by showing that it's improving, rather than degrading, the water in the Kaskaskia.



25-ACRE RESERVOIR stores intake, may be adapted for employees' swimming.



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WIDE WORLD

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LABOR . . . . . .

Softer Approach: While some other states have been enacting "right-to-work" legislation that the labor unions charge has a union-busting purpose, a milder step has been taken in Kentucky. Gov Lawrence Wetherby says that if a labor dispute threatens the general economy of the Blue Grass state, he'll call upon a new advisory board to serve in a fact-finding capacity. Members of the board are three labor union officials (AFL, CIO and United Mine Workers), three management men (from General Electric, International Harvester and Handmacher-Vogel), and the governor himself, representing the public's interests.

Louisiana's new right-to-work law –following enactment of similar laws earlier this year in Mississippi and South Carolina–makes a total of 17 states where such legislation is in effect.

In Idaho, the labor unions have succeeded in preventing a measure of this kind from being voted on in an initiative election. The state supreme court upheld the unions' contention that the title of the bill was defective. The court agreed with the AFL and CIO that calling the bill simply "Right to Work Initiative Proposal" ignores the measure's provision as to union membership.

•

New wage increase accepted by various locals of United Gas, Coke & Chemical Workers (CIO) include a 5¢/hour general increase for employees of International Minerals & Chemical Corp., Niagara Falls, N.Y.; 4¢/hour for workers at the McIntosh (Ala.) plant of Mathieson-Alabama Chemical Co.; and 9¢ to 9½¢/hour for employees of American Cyanamid at Wallingford, Conn.

•

Up to Congress: Last week's outcries by the big labor unions and more temperate criticism from the Chamber of Commerce of the U.S. about the National Labor Relations Board's new regulations on jurisdiction point toward even more pressure on Congress next January for revision of the Taft-Hartley law.

Earlier this month, NLRB posted new rules limiting its own sphere of action. Henceforth, NLRB will try to concern itself only with cases involving larger number of employees, leaving the various states and cities to deal with any labor disputes that may crop up in the thousands of small business concerns.

The board's Republican majority chose this course because of the belief that more labor tiffs "should be resolved closer to their origins." Both the AFL and the CIO are attacking this move as "an inexcusable evasion of the board's clear responsibility under the (Taft-Hartley) act" to assure to workers and employers in those small firms their rights under the 1947 labor act.

Principal fear of the national Chamber of Commerce is that the board's new ruling may put many small employers in "a limbo in which no legal recourse is available." The Chamber feels that Congress should define NLRB's jurisdiction by law so that every business will be covered by either state or federal labor law.

•

Fateful Week: The week of Aug. 9-13 promises to be an eventful one for organized labor in the chemical industry:

• The long-building struggle between pro-Bradley and anti-Bradley forces within the International Chemical Workers Union (AFL) is expected to enliven proceedings at ICWU's 11th annual convention, to be held that week in Chicago's Morrison hotel. A majority of the nine executive board members will be leading the move to unseat President H. A. Bradley, who has headed ICWU since its formation; but Bradley–a grizzled campaigner who doesn't shrink from fights–has weathered storms of criticism at previous conventions, and still holds the respect of many delegates and members. His foes have accused him of "one-man rule" and of failure to exploit the union's growth potential as rapidly as possible. The intra-union

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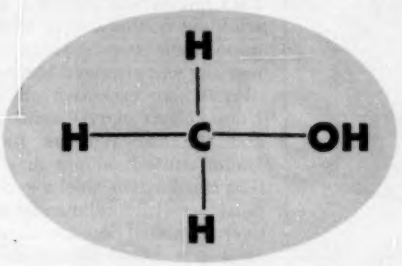

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B & I . . . . . .

rift has produced the resignation of Louis Belkin, ICWU's general counsel for the past six years; and a court battle over control of Local 521 and custody of its funds. In the Jeffersonville, Ind., courtroom as the hearing opened, Bradley sat apart from ICWU Vice-President Sidney Garfield and Secretary-Treasurer Marshall Shafer.

• In Washington, D.C., 12-man committees from two merger-minded CIO unions will sit down together to work out further details of the plan to unite their two organizations. This meeting was arranged last week at Detroit, where executive officers of the United Gas, Coke & Chemical Workers and the Oil Workers International Union carried on merger discussions that started two weeks ago. Negotiations are still preliminary and tentative; the actual decision on merger will be made by delegates to the two unions' conventions later this year. Gas-Coke's convention is scheduled for Sept. 13-17 in the Jefferson hotel, St. Louis; OWIU's convention probably will be held in November; exact time and place probably will be set during the executive board's meeting in September.

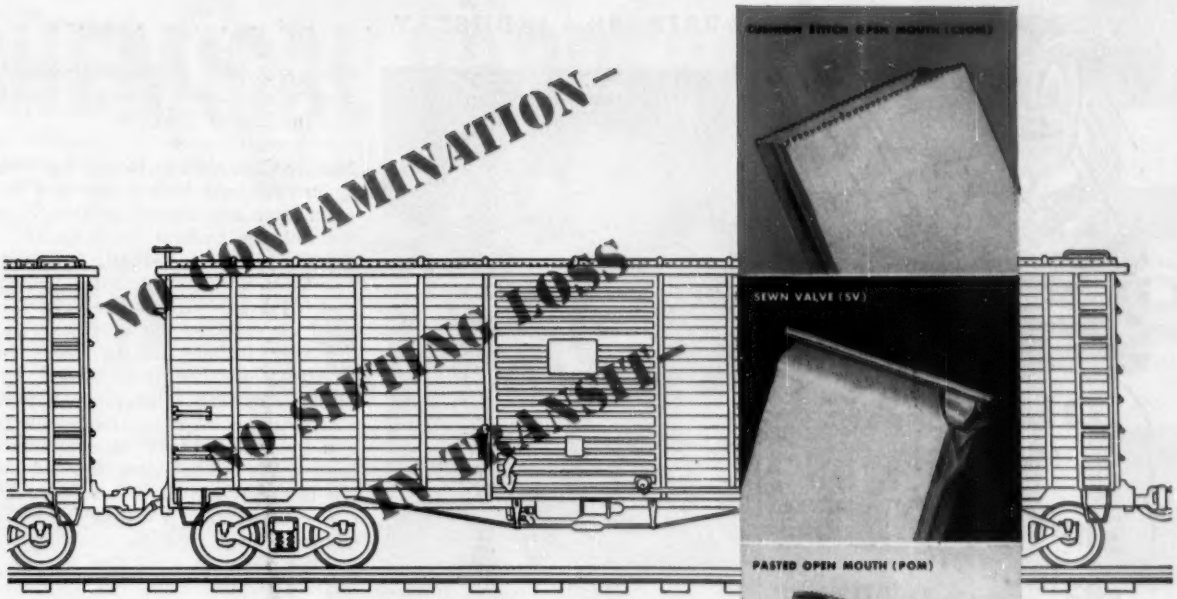
LEGAL . . . . . .

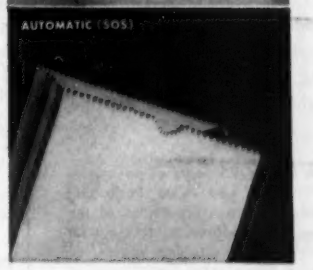
Fines in the Wind: It's becoming increasingly costly to be tangled up in litigation over alleged violation of air pollution statutes:

• At Louisville, Ky., where air pollution has been a fighting word since World War II days, industry has been footing bigger bills for abatement of pollution, and paying stiffer fines. The City-County Air Pollution Control District reports that Louisville plants have spent more than $10 million over the past seven years for pollution control equipment; and that the average fine paid by firms convicted of air pollution violations has gone up from $67 (eight-year average) to about $144 (1952-53 average).

• Another chemical concern in Philadelphia has been fined for alleged violation of a borough ordinance prohibiting noxious industrial fumes. A $100 fine was imposed by Justice of the Peace Joseph Garrity after hearing testimony that some 50 families in a four-block area were affected by fumes from the Brighton Chemical Co. at suburban Trainer, Pa.

• In the state's first air pollution lawsuit against a Harris County industrial firm, District Judge Phil Woodruff at Houston, Tex., refused to issue a temporary injunction against Gulf Chemical Co., but County Attorney Burke Holman says the lawsuit served its purpose. Dr. Walter Quebedeaux





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WIDE WORLD

FTC'S MASON: To become an FTC defendant, mere acquisition not enough.

had testified earlier in the hearing that the alleged nuisance had been abated by 50%, but a few days later he told the court that the abatement had been improved to 75%. Holman said another lawsuit will be filed against Gulf if abatement progress is not maintained.

•

Cracking Patents: What looks like the end of the 25-year litigation between William Whitman Co. and Universal Oil Products Co. (*CW Newsletter, March 14, '53*) came last week in Federal District Court at Wilmington, where Judge Richard Rodney ruled that Universal should pay $245,168.55 to the plaintiff. Whitman had sued to recover $1,614,709 (royalty payments plus interest) and exemplary damages amounting to three times that amount. This claim was based on the facts that some of the 1,700 patents that were licensed to Whitman under a 1937 agreement were later found to be invalid, and that there had been an irregularity in a 1932 lawsuit in which the court upheld Universal's contention that its Dubbs and Egloff patents took precedence over the Winkler-Koch patents on oil-cracking processes.

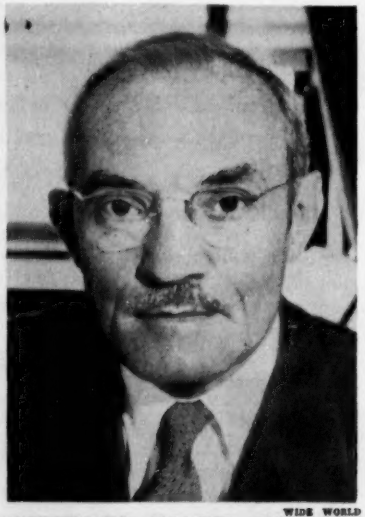
Judge Rodney denied the bid for exemplary damages, stating that Whitman "acquired no rights as a public vindicator or avenger" because of the 1937 contract. He scaled down the basic claim, figuring that the difference between Whitman's royalty payments and the value Whitman received from the use of those patents was $177,981, to which he added 5% interest from 1946. Some of the disputed patents had been issued to Dr. Gustav Egloff, Universal's research director and former president, American Institute of Chemists.

•

Merger Case Ruling: In the test case against Pillsbury Mills under the 1950 antimerger amendment to the Clayton Act, the Federal Trade Commission has refused to make Duff Baking Mix Corp. a defendant, but has ruled that if Pillsbury is found to have violated the new law, the divestiture order may include all the assets in question, whether now owned by Pillsbury or Duff. The charge is that Pillsbury sought to reduce competition by buying two rival companies. Last week's ruling was occasioned by the fact that Pillsbury now has sold one of those firms. A majority of FTC members held that the commission has the power to name Duff as a defendant in this case; but Commissioners Lowell Mason and Albert Carretta dissented, arguing that a company can be named in a complaint only when the evidence gives reason to believe that the company has actually been violating the law itself. They deny that mere purchase of property involved in an FTC action can be considered as grounds for a complaint.

•

Sorry, Too Late: A Florida State Supreme Court ruling against Victor Chemical seems to be a warning to industrial firms to go to court quickly if they have any doubt at all about the legality of a new tax. The court turned down Victor's suit to recover $5,261 paid under a use tax law since declared unconstitutional, holding that Victor sued too late.



WIDE WORLD

UNIVERSAL'S EGLOFF: His patents were valuable, but company overcharged.

CHEMICAL PROCESS NEWS

PUBLISHED BY CHEMICAL PROCESS DIVISION, THE M. W. KELLOGG COMPANY AUGUST 1954

NOTES ON SYNTHOL

Synthol is the name of the Kellogg-developed process for catalytically reacting synthesis gas (carbon monoxide and hydrogen) to produce a wide variety of hydrocarbon materials and chemicals. Synthesis gas for the process can be derived from either natural gas or coal.

* * *

The first plant to utilize Synthol on a commercial scale is now under construction by Kellogg in South Africa. Partial combustion of coal (from vast deposits near the plant site) will form the source of the synthesis gas; primary products of the plant will be "petroleum" fuels—around 60 million gallons per year, of which the major part will be motor gasoline.

* * *

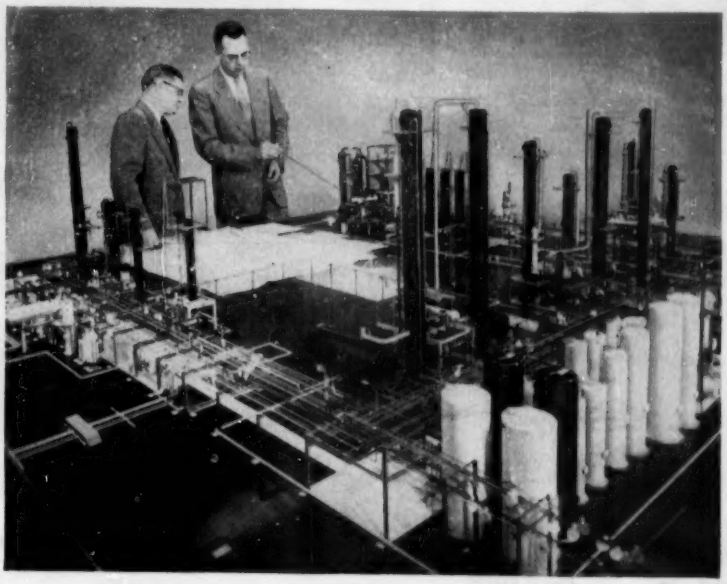
In addition to gasoline and fuel oil, the plant's output will include an impressive quantity of industrial and agricultural chemicals—about 125 million pounds. Many of these are oxygenated compounds, produced as by-products in the Synthol unit. While their volume is small in comparison with the enormous amounts of fuels produced, the higher market value of these chemicals adds substantially to the over-all attractiveness of the Synthol process.

* * *

The water-soluble or chemical stream from the Synthol unit is passed through a series of operations involving both extractive and conventional distillation to separate methanol, anhydrous ethanol, methyl ethyl ketone, and acetone. The methanol will be used as a solvent in the process and the ethanol will be blended into the gasoline pool. The other two chemicals will be marketed.

* * *

Additional equipment is being installed to produce commercial grade propanol and/or butanol, or to further process these products as additional gasoline.



Low Production Costs, High Yields and Flexible Operation Characterize New Phenol-from-Cumene Process

Shown above is a detailed model of a unique chemical plant Kellogg is currently building for Hercules Powder Company at Gibbstown, N. J. The plant will produce phenol, acetone, and methyl styrene, using the Hercules-Distillers process for oxidizing and splitting cumene. Kellogg, which developed the mechanical design of the commercial process in collaboration with Hercules, is also the originator of the process to be used for making the cumene feed.

The over-all process offers an unusual example of how refinery products can be upgraded to industrial chemicals to obtain a radical increase in value.

The phenol portion of the output is derived from the benzene part of the initial input. In the same way, the acetone produced is attributable to the low-cost propylene third of the feed.

As compared with other processes, the latter product—acetone—at present prices provides a bonus for the phenol produced as a major product. Moreover, the comparatively small quantity of methyl styrene produced can be separated for use in the plastics industry, or it can be converted back to cumene and re-used in the process.

For further information, technical data, etc., relating to chemical or petrochemical processing, write

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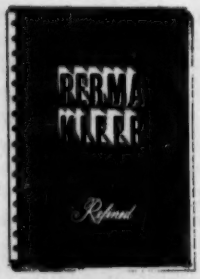

we also manufacture EDTA –in the name of PERMA-KLEER-50 . . . as specialists in the development of sequestering agents, we suggest you send for our latest revised booklet explaining testing methods and comparisons, pages 30-31-32 Make your own tests!

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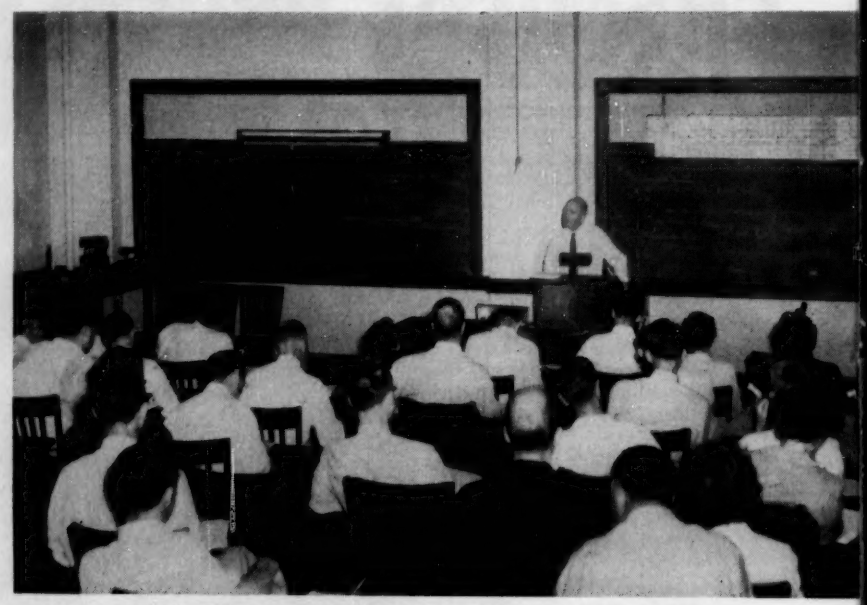


A.M. LECTURES: Cover all phases of economics, business activity.

Breeding Better Insight

While chemical men from Malibu to Nantucket are basking in the sun this week, 49 energetic university economists are winding up a six-week course at Case Institute, Cleveland. Purpose: to gain a better insight into the business man's thinking—to get a practical look at economics in action.

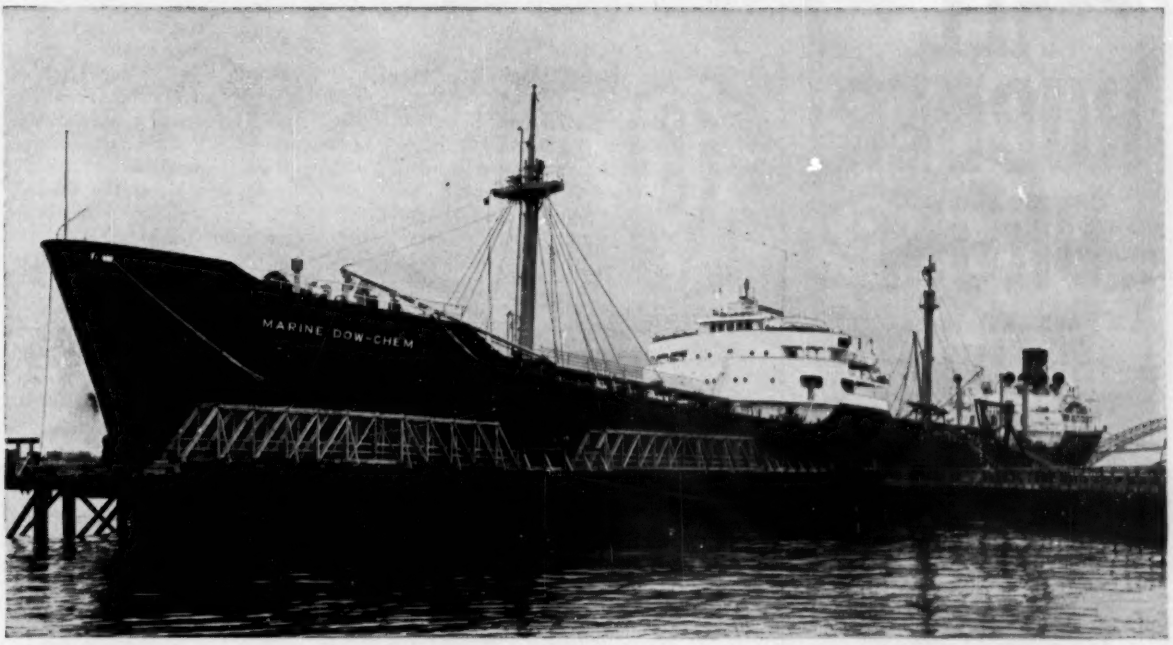
Genesis of the program (sponsored by Republic Steel at a reputed cost of $35,000) took place at Case in 1951, when school officials noticed that surveys of college seniors invariably show that undergraduates are notably lacking in practical knowledge of economics and an appreciation of business problems. How to tackle this problem? Case educators thought that the best way of reaching its students was through its teachers.

Thereupon a tentative program was drafted, submitted to management of Republic Steel and the summer session was an actuality. This year's group (the third) is described by Institute officials as the "oldest, most responsibly placed" yet. It includes, for example, 11 college presidents, department heads or deans, five full professors, eight associate professors.

The schedule calls for a solid five-day curriculum—beginning at 9 a.m. and more often than not winding up in an economic bull session in the dorms late at night. A visiting lecturer-economist (a different one each week, *see cut*) starts the morning session with a lecture (with time out for questions and discussion); after lunch, trips are made to plants, management offices where the group can get down to "brass tack" talks with company executives. Here, after a presentation by company officials of the firm's business functions in general (and as related to the product under study), the professors get a chance to fire as many

P.M. PLANT TOURS: Provide on-the-spot information.

DOW



S. S. Marine Dow-Chem on first arrival at expansive Bayonne Terminal.

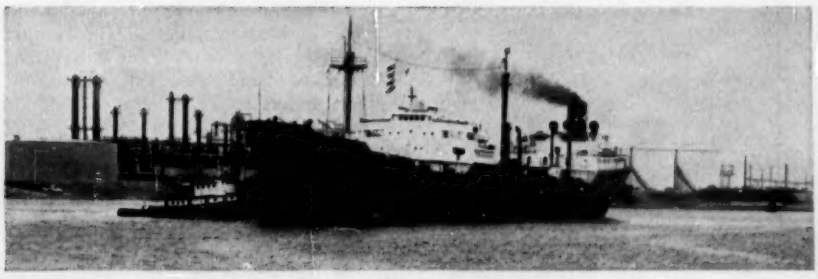
New Dow Ship and New Dow Terminals

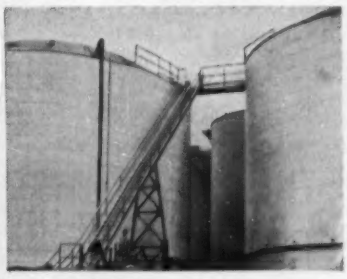
speed volume delivery of 73% caustic soda to users

The Dow Chemical Company now has extensive new caustic soda solution distribution facilities in operation. The *S. S. Marine Dow-Chem*, first tanker ever designed and built exclusively for the sea transportation of liquid chemicals, currently delivers 73% caustic soda in volume quantity to two new Atlantic seaboard bulk terminals, located at North Charleston, S. C. and Bayonne, N. J. Both this thoroughly modern 18,000-ton chemicals carrier and all terminal facilities for cargo unloading, storage and transshipment safeguard the uniform high purity of Dow's 73% caustic solution.

One hundred thousand pounds of commercially pure nickel were used in construction of the *Marine Dow-Chem's* caustic cargo tanks, pumpline and heating coils. Terminal storage tanks are fully nickel-clad, all loading and unloading pumps and lines are pure nickel. Nickel steam heaters keep 73% solution at the exact temperature desired.

This important distribution expansion means that Dow customers are assured even faster delivery—*another* good reason for placing that caustic order with Dow. THE DOW CHEMICAL COMPANY, Midland, Michigan.





New flagship of extensive Dow waterways fleet begins maiden voyage from Freeport . . . new nickel-lined tanks at Bayonne protect 73% caustic purity during storage.

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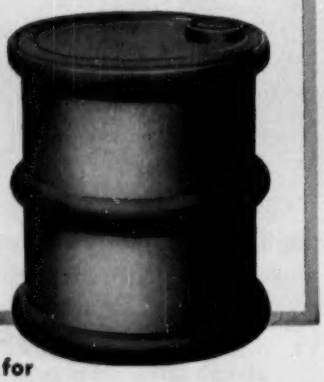

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frank and embarrassing questions as they want on how the company operates, how it finances, pays its bills, schedules production, meets competition, etc.

Registration's Restricted: Selection of the conferees is made by a three-man Case faculty committee headed by Case Tech's Ernest Furrer, assistant professor, engineering administration department. Choice (on recommendation by college presidents) is based on two major considerations: the teacher's responsibility (the number of students he reaches), and his lack of personal experience in industry.

But, as Case has learned in its two-year shakedown experience, it's not only the professors that are in need of gaining better insight. Companies (among them chemical companies) gain much valuable knowledge from the education-industry contact—howsoever brief it may be.

In a preprogram report to Cleveland industries taking part in the 1954 course, for example, Case Tech officials handed out some frank and surprising findings made by Opinion Research Corp., which interviewed the 1953 group. Over-all conclusion: "the view of business executives that visiting economists get leaves much to be desired." More than half of the professors attending last year's class expressed doubts that company executives were well posted on the subjects they discussed with the educators. Some typical criticism: "A few executives displayed downright ignorance of their own company's problems. Most either do not know the answer, or don't care to see the implications of our questions. Some were keenly alert—but others weren't, they simply didn't seem to know what we were talking about."

ORC has an explanation for the economists' critical apprasial of business executives, however.

- From the economist's vantage point, the businessman's view of the economic system is bound to seem narrow. Almost any economist, moreover, consciously or unconsciously, is apt to resent any suggestion that a businessman can tell him what he ought to know about economics.
- Secondly, educators are often confused by what they regard as the executive's schizophrenia on government regulations. As they see it, 20 years of government regulation has developed an executive attitude of "regulation be damned." And broad generalizations just aren't the educator's cup of tea.
- Third, it well may be that educators concentrate on criticism of business—simply because business hasn't offered them the opportunity to submit constructive suggestions.

It was with the obvious hope of bettering two-way communications that Case Tech passed these crisp comments on to companies taking part in the program this year.

But they are sold on the over-all value of the course. So great has been the response to "Economics in Action" that the movement's spread to other colleges. This year the University of Wisconsin has launched an industry-backed four-week course, patterned after the Case system. And schools in Alabama, Pennsylvania, and California plan to start similar programs just as soon as they can round up support.

What they're seeking is financial help from management to start the projects. Once rolling, participants say, the idea sells itself.

FOREIGN . . . . .

Mexican-U.S. Cooperation: Dow Chemical Co. has reached an agreement with Pyrina, S.A., whereby Dow acquires an interest in Pyrina, and the latter will manufacture in Mexico basic pharmaceuticals—such as aspirin and salicylic acid. Mexican government authorities are lauding the deal, point with approval to the "valuable technical assistance that Dow and other chemical companies are extending for the economic development of Mexico."

Simultaneously, Dow Chemical Inter-American Ltd., an export subsidiary, says it will establish a new sales office in Mexico City.

•

ICI Reprieve: The Arab League has granted Imperial Chemical Industries another six months' grace to settle its financial relations with Israel. In a statement to the Arab boycott committee, ICI executives said that it was difficult, if not impossible, for the company to wind up all the company's financial and trade relations in the short time stipulated. The League approved the request for a time extension, has forwarded its recommendation on to member states for ratification.

•

Dutch-Japanese Venture: An agreement has been reached between Royal Dutch Shell and the Mitsubishi Chemical Industries to form a joint petrochemical-producing company to be known as Mitsubishi Shell Petrochemical Co., Ltd. Capital: $2.7 million—split on a 50-50 basis; issued capital $1.1 million.

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PULP AND PAPER—Size and binder for alkaline filled papers. Wax mixtures for coating and glazing paper. Binder for clays in coated paper. Laminating compound for built up boards. Stiffening agent for paperboard containers, boxes, cans, drums, tubes.

CHEMICALS—As a compounding aid for plastic materials and rubbers. Extender, carrier, and adhesive in the compounding of insecticides and fungicides. Additive for laminating and polish waxes. Maleic anhydride adducts.

PROTECTIVE COATINGS—Water based paints. Oleo resinous varnishes. Caulking compounds. Newspaper inks. Rust preventitive coatings.

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Iodine Value (Corrected for Substitution)	30
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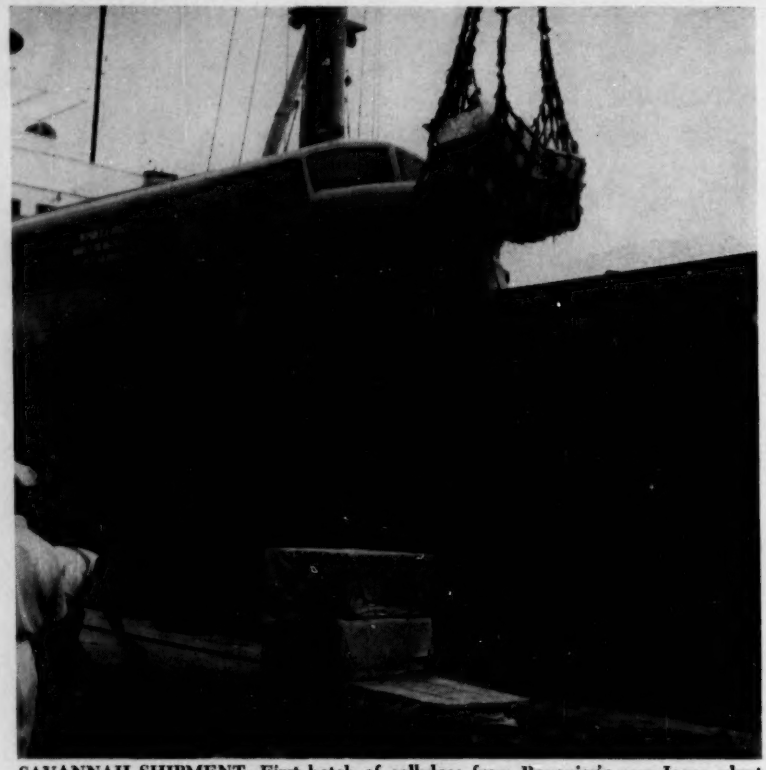

SAVANNAH SHIPMENT: First batch of cellulose from Rayonier's new Jesup plant to overseas users heads toward Argentina.

agreement will soon be submitted to the Japanese government for approval. Initial project will probably be the construction of a plant (outside Nagoya) to produce annually 2,000 tons of isopropyl alcohol, 3,000 tons of acetone.

The president of the newly formed corporation will be appointed by Mitsubishi, and the vice-president by Shell. Royal Dutch Shell will supply the manufacturing process know-how, for which the Japanese enterprise will pay a royalty fee of 5% of sales for the next five years.

General reaction to the plan from Japanese government authorities has been enthusiastic, but Japan's coal and chemical industries have been protesting strongly against the two-company tie-in arrangement. Reason: many existent chemical producers think that the additional acetone capacity will deal a heavy blow to Japan's fermentation industry, will make the present predicament (overproduction in many lines of chemical manufacturing) even more pressing.

•

Argentine Import: First shipment of cellulose from Rayonier's new Jesup, Ga., plant (*see cut*) is headed this week for Argentina aboard the SS *Rodero*. Typical of the gradual relaxation of Argentinian import controls, import of cellulose from the U.S. to Argentina this year should greatly exceed 1952, 1953 quotas.

•

Phosphates/Jordan: The U.S. has signed an agreement with the Jordan government whereby the U.S. will grant Jordan $8 million as a "grant in aid." The lump sum has no relation to present Point Four aid, is simply an additional grant made for the specific purpose of developing such major projects as phosphate and manganese mines.

KEY CHANGES. . .

Howard J. Morgens and **Walter L. Lingle, Jr.**, to executive vice-presidents, **Renton K. Brodie,** to administrative vice-president, **Kelly Y. Siddall,** to vice-president and comptroller, and **W. Rowell Chase** to general advertising manager, Procter & Gamble Co., Cincinnati.

Sumner H. Williams, to vice-president and general sales manager, Dyestuff and Chemical Div., General Aniline & Film Corp., New York.

Edward M. Melton, to general manager, Allied Chemical International Corp., New York City.

"on stream" at Tuscola, Ill....

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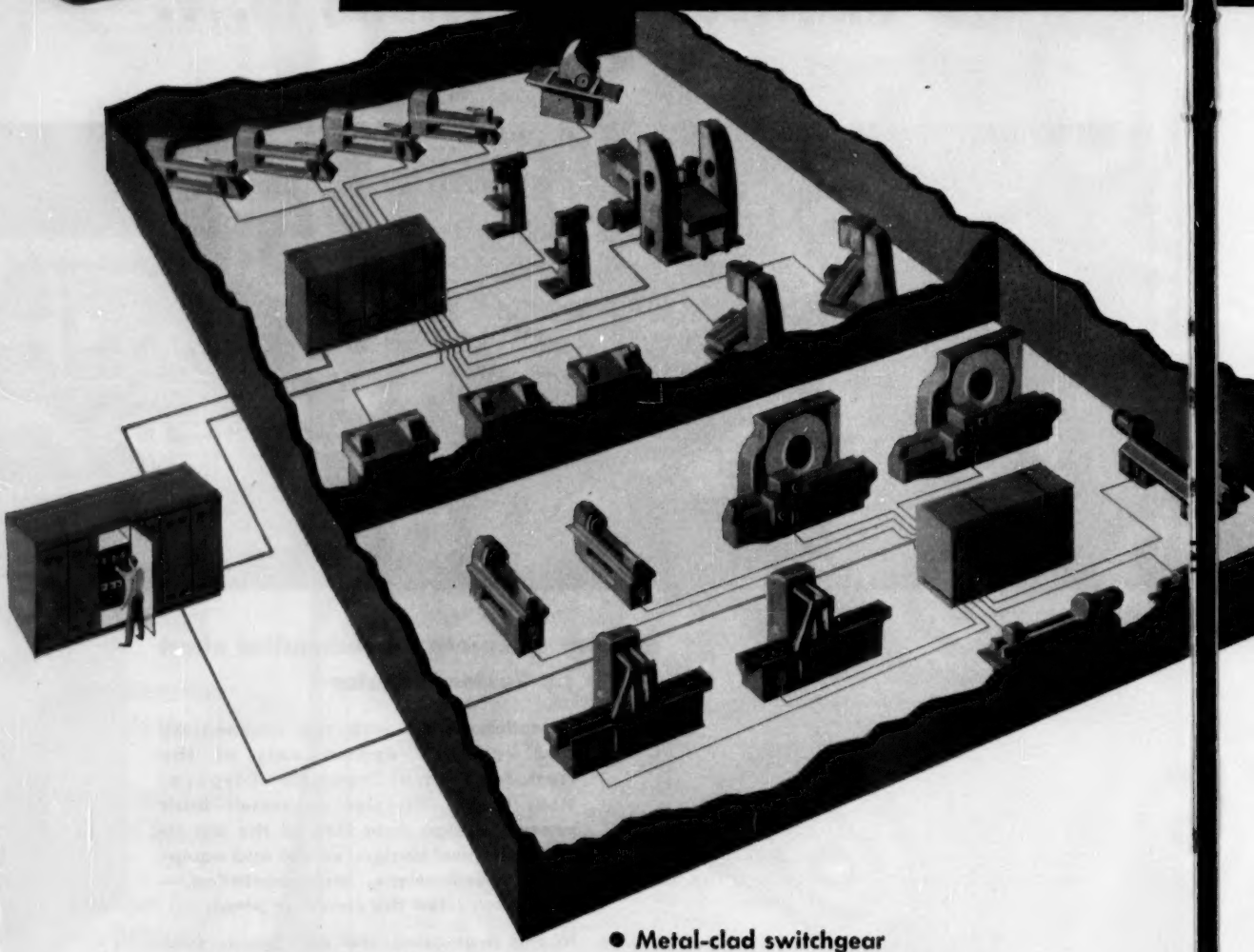

MODERN PLANTS USE these items of electrical distribution equipment.

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- Load center unit substations
- Bus duct
- Individually enclosed breakers
- Low voltage switchgear
- Frame-mounted oil circuit breakers

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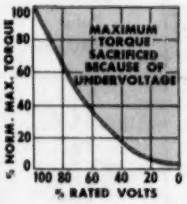
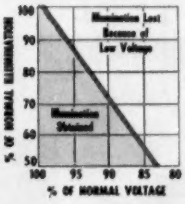
Cut Operating Costs 6 Ways — Improve your Distribution System With Allis-Chalmers Switchgear

In many plants the electrical system grew piecemeal. New machines were added to existing feeders; long, low voltage feeders were added for new groups of machines — and the whole system became inefficient and even dangerous. If this is the case in your plant, here are some of the losses you can avoid by modernizing with Allis-Chalmers switchgear:

1 Torque loss — Torque and horsepower drop when voltage drops below rated voltage of motors. Jobs take longer, because reduced torque necessitates lighter cuts on machine tools. Major cause of undervoltage is long, low voltage feeders. Placing unit substations at load centers shortens low voltage cable . . . improves voltage.



2 Illumination loss — You get less lumens per dollar when voltage is low. In addition, most studies show workers see better, produce more when illumination level is high.



3 Production loss — Standard Allis-Chalmers switchgear designed to accommodate special circuit schemes that will assure uninterrupted power for automation or continuous processing.

4 Motor burnout — Individually enclosed low voltage circuit breakers at each machine protect motors from faults and from overloads that might cause burnouts . . . protects you from lengthy interrupted production.

5 Space loss — Compact Allis-Chalmers switchgear units fit anywhere. Use non-productive areas such as the roof, basement, balcony or space outside near the building.

6 Power loss — Old breakers in many plants are now inadequate to handle a short circuit because of increased system capacity since the time they were installed. A major fault could cause equipment failures and prolonged outages. If your plant is typical, any breaker over 10 years old is probably inadequate today, because of your increased use of power.

get more information

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n-Hexyl Amine	101.19	0.7675	131.8	67	1.2
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C W Report

by Herman K. Nieuwenhuis

Petrochemicals Pre-empt Organic Output

The word "petrochemical" has been popularized and romanticized; and it's a word that's frowned on by some chemical men.

At the same time, it's descriptive of a major, basic segment of the process industries. Like it or not, if all or part of your raw materials depend on natural gas or petroleum, you're in the "petrochemical" business.

The Thirty-Years Wonder: Commercially, petrochemicals are barely 30 years old. Yet today, they're made by over 140 companies, at least 58 of which are oil refiners. They've attracted such diverse companies as W. R. Grace (shipping) and Deere (farm machinery), have been chosen by them as their initial products in the process industries. They're made, of course, by practically every major chemical company.

Petrochemicals are a multibillion-dollar business; in 1952, for instance, their product value amounted to $2.7 billion. In the same year, they accounted for about 73% of all the organic chemicals made in this country.

When betting on a horse race, it's important to consider a number of variables. The most important are the condition of the track and the past performances of the jockeys as well as the horses.

It's about the same with the petrochemical industry, except that when looking into the future, the variables are even harder to measure.

Chemical Firms' Route

Right now, chemical companies ac-

Meet the Author

HERMAN K. NIEUWENHUIS joined Shell's petrochemical department in 1929 shortly after he graduated from Holland's Amsterdam University with a degree in economics. He has thus been associated with the petrochemical industry almost since its inception. He has headed up the International Hydrogenation Engineering and Chemical Co. of the Netherlands as well as several subsidiaries of the petroleum and processing fields in which petroleum and chemical firms participated. During the war, he served as an economic consultant to the government on petroleum matters. Since 1950, he has been managing partner of Chemical Projects Associates (New York City), where he devotes most of his time to economic consultation on petrochemicals.

C W Report

count for the great bulk of total petrochemical production. They entered the field principally to broaden the base of their raw material supplies. But they've advanced their position through diversification and both forward and backward integration. Here's a rundown of several major firms' present activities, the best measure of their likely avenues of future expansion.

Allied Chemical. One of the biggest of chemical companies, Allied has held a prominent position in coke and coal-tar derivatives, acids and alkalies. More recently, it has been flexing its corporate muscles in the petrochemical field, has inaugurated an ambitious program in:

- Nitrogen. Solvay Process Div. has converted two ammonia plants in South Point, O., and Hopewell, Va., to a natural gas operation. Its since-formed Nitrogen Division took over Solvay's nitrogen and organic manufacturing facilities, has just brought in a $25-million plant for making ammonia, urea and other nitrogen fertilizers at La Platte, Neb. Gas for the operation comes from the Northern Natural Gas Co., which has built a 6½-mile pipeline from its Bushton, Kan., station for the purpose.

The firm is also expanding its South Point nitrogen facilities at a cost of $5 million. This should double urea capacity there. Plans are also under way to make a urea fertilizer compound and urea cattle feed.

- Methanol-formaldehyde. Another project at Hopewell is a $12-million, DPA-certified methanol and formaldehyde plant.
- Phenol. The Barrett Division is bringing in a 20-million-lb./year phenol plant at Philadelphia. It will employ Allied's process of making the phenol from cumene. Its source of propylene has not been disclosed.
- Ethylene oxide-glycol. The Nitrogen Division has just completed a $5.5-million ethylene oxide-glycol plant at Orange, Tex. It's making the oxide by direct oxidation of ethylene, delivered via a 20-mile pipeline from Gulf Oil's Port Arthur refinery. Allied is also reportedly considering the manufacture of other ethylene products at Orange at a later date.
- Polyethylene and benzene. Semet-Solvay, in 1953, placed onstream a $7-million plant at Buffalo to produce medium-molecular-weight polyethylene, which it markets as a high-grade wax. Synthetic benzene is also made at the plant. And though the firm has held the details of the operation closely, the benzene and ethylene are probably derived from the cracking of heavy oil.
- Nylon. Allied holds a $9,226,000 certificate of necessity for a plant to make 20 million lbs./year of a nylon that's based on caprolactam. Construction of the plant is well advanced, should be completed before the year is out.

American Cyanamid. Cyanamid is conducting two frontal assaults on petrochemicals through its subsidiary Jefferson Chemical (held jointly with The Texas Co.) and through its own activities.

Jefferson, organized in 1944, makes ethylene glycol, polyglycols and ethanolamines at its Port Neches, Tex., plant. Capacity for the ethanolamines is being boosted, and an alkyl phenol unit has been built.

Jefferson gets its ethylene from The Texas Co.'s refinery at Port Arthur, its lime and chlorine—for conversion of ethylene into the oxide (via the chlorohydrin process)—from Cyanamid. In return, it supplies Cyanamid with chemicals like ethylene oxide, needed in the manufacture of acrylonitrile and other compounds.

May 1952, marked Cyanamid's first independent entry into the petrochemical field. At that time, it reached its decision to make chemicals from natural gas in Jefferson Parish, La. (about 10 miles above New Orleans, on the west bank of the Mississippi). Products there include ammonia, acetylene, hydrogen cyanide and their derivatives, including acrylonitrile and ammonium sulfate. Its acrylonitrile output is slated principally for captive use in synthetic fibers, soil conditioners and other products. An acrylic fiber plant is already under construction at Columbia, S.C.

The company's interest in ammonia is further evidenced by its unsuccessful high bid on the government's ammonia facilities at the Louisiana, Mo., Ordnance Works and the plans for a urea plant at Avondale, La., for which it received a $7.5-million certificate of necessity.

Celanese. Dependent on a relatively small number of chemicals that can be derived from petroleum, Celanese is an extreme example of a firm integrating back to its raw materials. It has acquired interest in a number of oil and gas wells. And though production from these does not contribute a significant portion of its raw materials needs, the acquisitions are nevertheless indicative of the over-all policy with respect to integration.

At Bishop, Tex., Celanese operates the first large-scale plant of its type in the U.S., oxidizing natural gas (mainly butane and propane) to produce a variety of chemicals. Principal products are acetic acid, acetone, formaldehyde, propionaldehyde, methyethyl ketone, paraformaldehyde, methyl, ethyl and n-propyl alcohol, formic, acetic and propionic acids and propylene glycol.

Last year, the company completed a similar plant at Pampa, Tex. The latter plant has facilities for making 30 million lbs./year of vinyl acetate.

Moreover, Celanese, at Bishop as well as in Newark and Chicago, is now making commercial quantities of n-propyl acetate, the first of an intended whole family of esters.

Also at Bishop, Celanese has consolidated its position in trioxane, made from paraformaldehyde. Production of trioxane amounted to between 6-7 million lbs. in 1951, and Celanese produced about two-thirds of the total. With its added capacity, it is now even more dominant in that particular field.

Commercial Solvents. The first producer of commercial synthetic methanol (in 1927), Commercial Solvents also built and operated for the government a synthetic ammonia plant based on natural gas at Sterlington, La. It purchased the plant after the war, by 1950 had increased production to 65,000 tons/year. Further significant expansion is known to be under way. One unit of the Sterlington plant was redesigned to produce methanol and its derivatives (formaldehyde, etc.).

Other interests of Commercial Solvents in the petrochemical field include the manufacture of a wide variety of nitroparaffins. It has operated a pilot plant for many years, has been steadily increasing output. Most of the nitroparaffins currently produced are based on propane.

Commercial Solvents markets important quantities of ethyl alcohol, which it makes in its own fermentation plants, also purchases from National Petro-Chemicals. It also buys large amounts of ethylene glycol from Dow and Wyandotte for its antifreeze business.

Thus, the company would seem to be at least potentially interested in ethylene for the manufacture of ethylene glycol and synthetic ethanol. As yet, however, it has disclosed no plans

What Principal Chemical Companies Are Doing in Petrochemicals

Company	Natural Gas	Basic Chemicals Made from Olefins			Aromatics
		C_1	C_3	C_4	
ALLIED	Ammonia & derivs.	Oxide, glycols Polyethylene (med. mol. wt.)	Acetone (via cumene)	—	Phenol (via cumene)
AMERICAN CYANAMID	Ammonia & derivs., acetylene, HCN, & derivs.	—	—	—	—
CELANESE	Aldehydes, ketones, alcohols, acids	—	—	—	—
COMMERCIAL SOLVENTS	Ammonia & derivs., methanol & derivs.	—	—	—	—
DIAMOND ALKALI	—	Vinyl chloride & other chlorinated ethylene derivs.	—	—	—
DOW	—	Oxide, glycol, amines, vinyl chloride & derivs., ethyl bromide	Propylene glycol, glycerine, u/c	Butadiene	Styrene, aniline, vinyl toluene, vinyl xylene*
DU PONT	—	Polyethylene, TEL	—	Nylon salts	Nylon salts
HERCULES	Ammonia & derivs.	—	Acetone (via cumene)	—	Phenol (via cumene)
MATHIESON	Ammonia & derivs.	Oxide, glycols	—	—	—
MONSANTO	Acetylene, HCN & derivs.	Ethyl benzene, polyethylene u/c	—	—	Ethyl benzene*
ROHM & HAAS	Acrylics	—	—	—	—
SPENCER	Ammonia & derivs.	Polyethylene u/c	—	—	—
UNION CARBIDE	Acetylene, HCN, & derivs.	Oxide, glycols, amines, ethers, ethanol, vinyl chloride, polyethylene, dichloride, trichloroethane	Isopropanol, acetone, etc., allyl alcohol, oxide, glycols, ethers, dichloride	Butadiene	**

* Only some of the aromatic raw materials may be petroleum-based.
** Carbide plans to manufacture aromatics by hydrogenation of coal
u/c Under construction.

for proceeding along that line.

Diamond Alkali. Originally organized as a supplier of alkalies, Diamond has more and more been switching the emphasis to organics. Not too long ago, it embarked on a two-year, $30-million program of expansion, diversification and modernization designed chiefly to extend its activities in the organic field—notably in chlorine-based plastics, solvents, other petrochemicals, and insecticides. Its purchase of Kolker Chemical Works, Inc., was a logical outgrowth of this program.

Last year, Diamond put into operation a $2-million plant at Deer Park, Tex., to make perchlorethylene and other chlorinated products.

In 1951, Diamond teamed up with Shell in a vinyl chloride venture. When the plan for a joint venture fell through, Diamond proceeded on its own with the construction of a plant—although smaller than the one contemplated originally.

Dow Chemical. Like Celanese, Dow affords a good example of a firm that is riding a strong trend toward backward integration. It has even gone so far as to acquire controlling interest in an oil company, the Brazos Oil and Gas Co. But as is also the case with Celanese, the holding does not provide the company with an important source of raw materials.

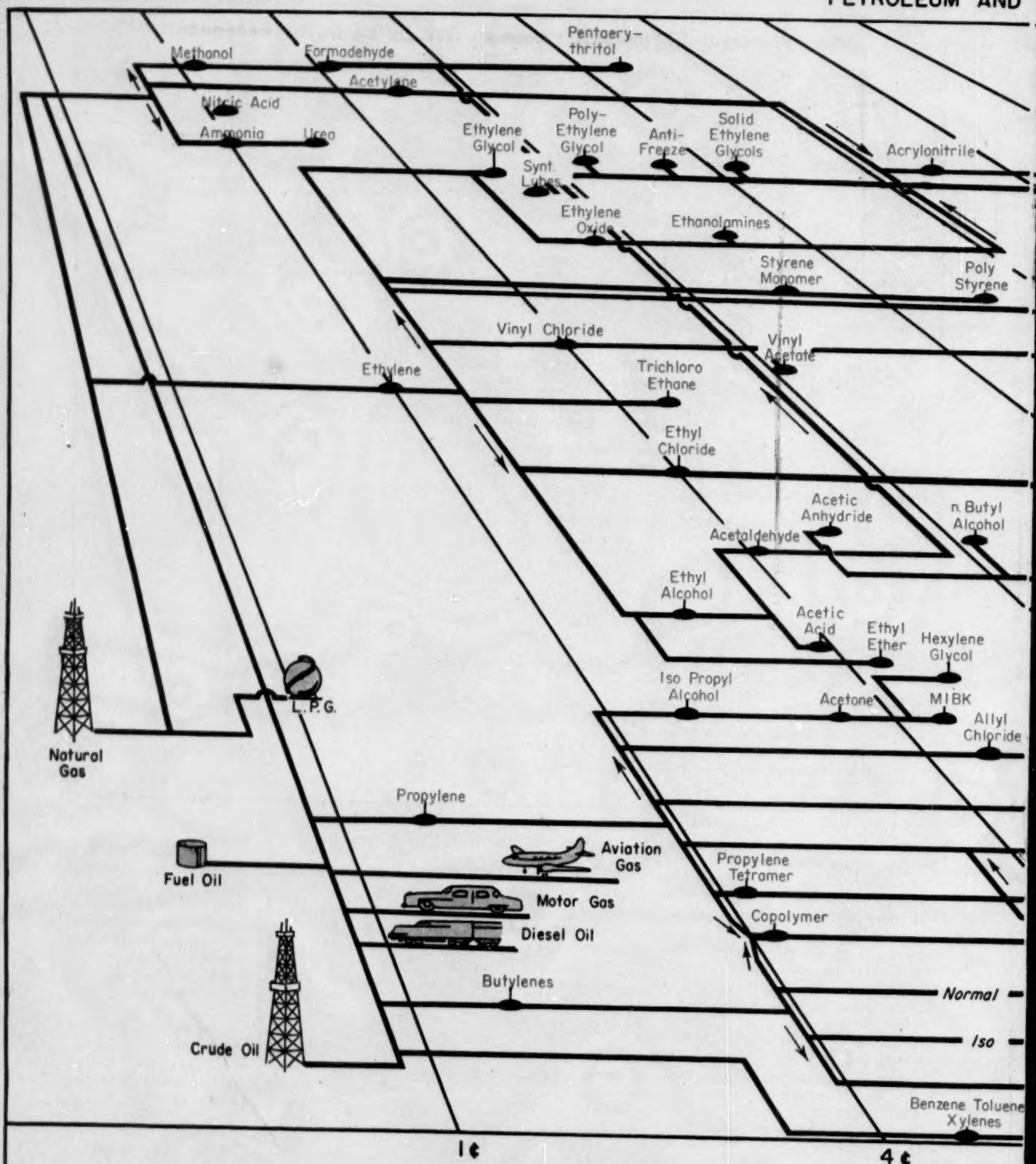
At present, Dow qualifies as the second biggest producer* of petrochemicals. It also qualifies as one of the pioneers in the field, having started market development work on ethylene-based chemicals at the end of World War I. Not until the late '30's, however, did it achieve any degree of success.

In 1939, Dow started commercial production of ethylene oxide and glycol at its Midland plant, shortly afterwards added a second unit at Freeport, Tex. Both use the chlorhydrin route, work on captive raw materials.

At about the same time, Dow installed the first commercial styrene and butadiene plants in the U.S. Today it's still one of the biggest makers of styrene, both for synthetic rubber and for plastics.

Its Texas Division is currently wrapping up a $175-million expansion program started four years ago. New construction is also going on at its Midland plant. Petrochemicals play a significant role at both places with capacity for ethylene, glycols, methylene chloride,

*Biggest: Carbide and Carbon.


Methanol
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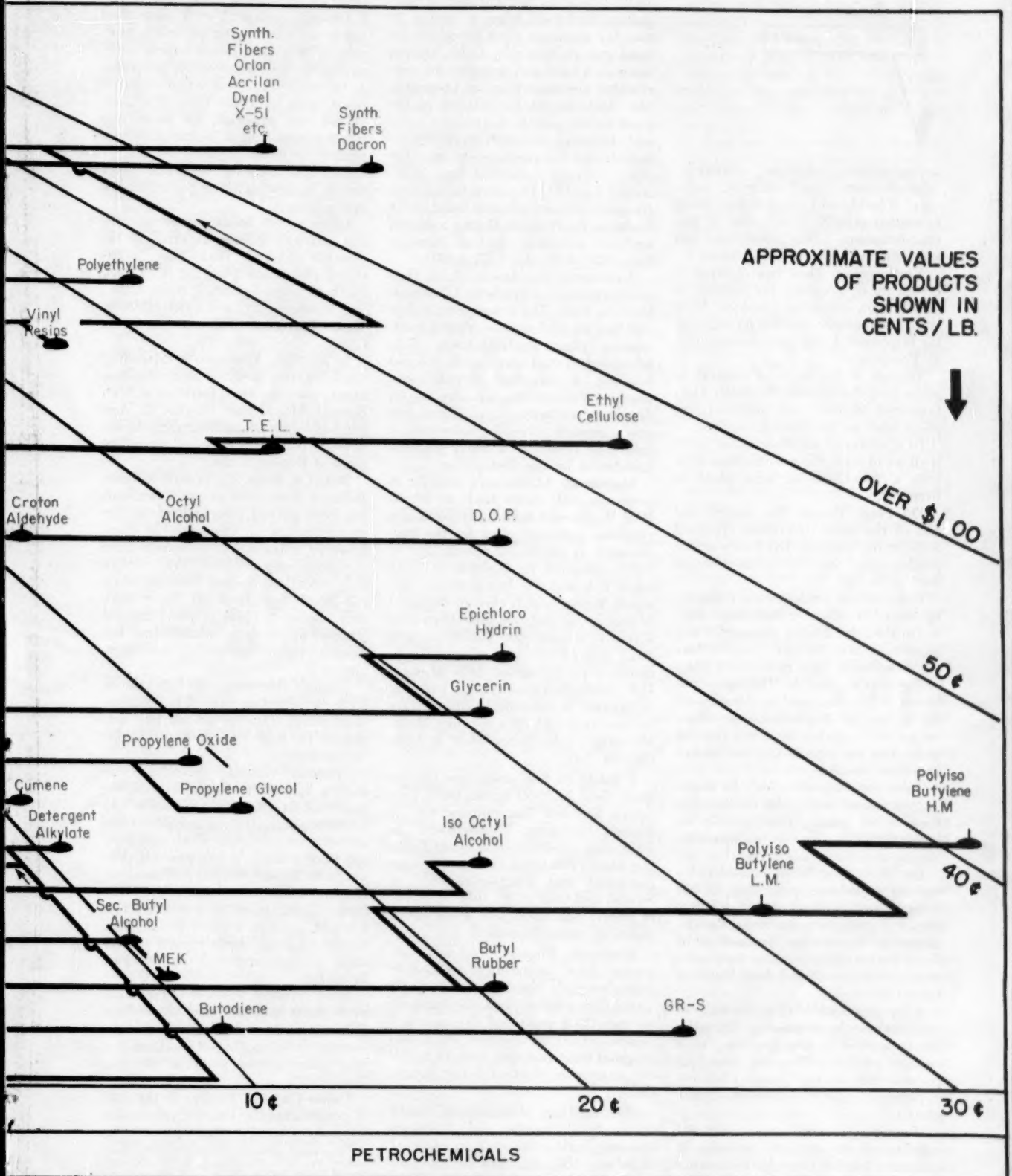
PRODUCTS OF CONVENTIONAL REFINING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Synth. Fibers Dacron
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APPROXIMATE VALUES OF PRODUCTS SHOWN IN CENTS/LB.
Ethyl Cellulose
T. E. L.
OVER $1.00
Croton Aldehyde
Octyl Alcohol
D.O.P.
Epichloro Hydrin
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Propylene Oxide
Cumene
Propylene Glycol
Polyiso Butylene H.M
Detergent Alkylate
Iso Octyl Alcohol
Polyiso Butylene L.M.
40¢
Sec. Butyl Alcohol
MEK
Butyl Rubber
Butadiene
GR-S
10¢
20¢
30¢
PETROCHEMICALS

methylstyrene, ethylene dibromide, ethanolamines, vinyl chloride, polyvinyl chloride and vinyltoluene being expanded rapidly. Production of styrene-butadiene latex, polystyrene and synthetic fibers is also being boosted.

Furthermore, Dow has received a certificate of necessity for building a $5.5-million glycerine plant at Midland, has recently doubled its capacity for bisphenol A (epoxy intermediate) at Freeport.

Though it has evinced interest in other propylene-based chemicals (i.e., isopropyl alcohol and acetone), no plans have as yet been formalized.

In addition to its other plans, Dow is all set to crash the polyethylene field with a 20-million-lbs./year plant at Freeport.

Du Pont. Though the largest and one of the most diversified chemical firms in the country, Du Pont's active participation in the petrochemical field is limited.

Reason: the tendency to integrate backward is probably least noticeable in Du Pont. Its driving philosophy has apparently been to carry manufacturing activities as close to the final processing step as possible. The company, however, has managed to compensate for its relative dependence on others for its raw materials by never putting more than one egg in any one basket whenever possible.

Take the case of nylon, its single biggest money-maker. Of the five Du Pont nylon plants, two operate on furfural, one on benzene, one on cyclohexane and one on butadiene.

Du Pont is a heavy spender for various petroleum products. It has strengthened its bond with the petrochemical industry recently by the decision to discontinue production of fermentation ethanol and to secure, instead, synthetic alcohol from National Petro-Chemicals.

It has also decided to up its stake in polyethylene by expanding its polyethylene plant in Orange, Tex., to a capacity of 100 million lbs./year. (It gets ethylene for the Orange plant via a pipeline from Gulf's Port Arthur plant.)

Hercules. Limited raw material supplies of the natural products it consumes has led Hercules to turn its attention to petrochemicals. Back in 1940, it took its first big step in integrating backward when it built a 30 ton/day ammonia plant based on natural gas at Hercules, Calif. During the war, it built and operated the government ammonia plant at Louisiana, Mo. And despite the interest in the plant on the part of American Cyanamid, Hercules exercised its option—as builder and first operator—to lease the plant with an option to buy (*CW, April 24, p. 18*). The week before that, Hercules revealed plans to build (with Alabama By-Products Corp.) a 45,000 ton/year ammonia plant at Birmingham, Ala. (*CW, April 17, p. 20*).

To diversify in petrochemicals, Hercules organized a Synthetic Chemicals Dept. in 1943. The department is now building an $8.5-million phenol-from-cumene plant at Gibbstown, N.J., scheduled to start up this fall. It's also building a dimethyl terephthalate plant at Burlington, N.J., for use in Terylene synthetic fiber. These two new projects should represent a handsome return on a heavy research investment by the firm.

Mathieson. Mathieson's activity in petrochemicals dates back to World War II, when it built and operated a synthetic ammonia plant for the government. It purchased the facility in 1948, solidified its position in 1951 when it leased the Morgantown Ammonia Works, which, though designed to operate on coal, has since been converted to natural gas. Mathieson now owns over 35,000 tons of annual ammonia capacity—about 10% of total U.S. synthetic capacity. It's carrying its interest in ammonia a step further by operating with Olin (through Matholin Corp.) a hydrazine plant at Lake Charles, La.

It made its first move into the organic field in 1950 when, with Tennessee Gas and Transmission Co., it formed Mathieson Hydrocarbon. In 1951, this subsidiary was merged into the Mathieson organization. Through purchases and mergers—notably of Squibb and Olin (*CW, July 10, p. 16, et priori*) Mathieson has continued a policy of diversification.

Monsanto. Though of a relatively recent date, Monsanto's activity in petrochemicals has been intense. Its Texas City styrene plant, for instance, an important source of the material, completed an $8.6-million expansion program two years ago. And it's building a styrene plant at Long Beach, Calif.

Its subsidiary, Chemstrand (held jointly by Monsanto and American Viscose) built a $30-million plant at Decatur, Ala., for making Acrilan synthetic fiber and an $80-million plant at Pensacola, Fla., for nylon.

Closely connected with these fiber plants are some major expansion projects of Monsanto. These include a 35-million-lb./year acrylonitrile plant and a 100-million-lb./year vinyl chloride plant, both at Texas City. The bulk of the raw materials for these two plants comes from a Sachse acetylene plant built on an adjacent site.

Tail gas from the acetylene plant serves as raw material for methanol and ammonia.

Other recent Monsanto petrochemical activities include an ethylene dichloride plant at Texas City, a tricresyl phosphate plant at St. Louis, synthetic phenol plants at Avon, Calif., and Monsanto, Ill., and a polyethylene plant (66 million lbs./year) at Texas City.

In addition, Monsanto is expanding vinyl butyrate facilities at Springfield, Mass., phenolic resin facilities at both Springfield and Port Plastics, O. And it's building a $5-million phthalic anhydride plant and a dioctyl phthalate plant at Everett, Calif.

Rohm & Haas. Up to now at least, Rohm & Haas' role in petrochemicals has been played principally from the standpoint of a customer. It does, however, make acrylic monomers from acetylene* at Deer Park, Tex., a plant only recently converted from an ethylene-based operation. At Deer Park now, Rohm & Haas employs natural gas and ammonia to manufacture hydrogen cyanide for methyl methacrylate.

Though the company has periodically indicated an interest in the manufacture of basic chemicals like ammonia, no such project has thus far materialized.

Spencer. Among chemical companies, Spencer is unique in that virtually all its activities are confined to petrochemicals. Having purchased two government ammonia plants and having built a third, it has proceeded to integrate toward the finished product. Methanol, for instance, from the Pittsburg, Kans., plant is converted into formaldehyde at a plant in Chicago. And the formaldehyde is used at Chicago (with ammonia) to produce hexamine.

More recently, Spencer has decided to diversify into the field of ethylene derivatives. As a first step in this direction, it will build a 45-million-lb./year polyethylene plant at Orange, Tex.

Union Carbide. Pioneer in the field of petrochemicals, Union Carbide and

* From calcium carbide at present. It's conceivable, however, that with a bigger output, the firm would switch to making acetylene from natural gas (*CW, Feb. 14, '53, p. 44*), in which case it could employ the tail gas for ammonia or methanol.

Carbon is still far and away the biggest producer, thanks largely to the output of its Carbide and Carbon Chemicals Corp. It's also one of the most diversified companies in the industry. Here are some of the significant dates in Union Carbide's history:

• 1920—Carbide and Carbon Chemicals was formed to develop the new field of petrochemicals. Starting with the production of liquid propane, it branched out (in 1925) with the manufacture of acetone, Cellosolve, Carbitol and other solvents in a plant in South Charleston, W. Va. A third plant at Whiting, Ind., was subsequently built to make ethyl alcohol, iso-propanol and glycols from petroleum cracking gases. This plant derives most of its raw materials from the nearby refinery of Standard Oil (Ind.).

• 1924—With two other firms, UCC organized Niacet to synthesize acetaldehyde, acetic acid and vinyl acetate from acetylene. This group was later merged into the parent corporation.

• 1928—Pilot-scale production of vinyl plastics got under way. By 1936, the first commercial plant was operating. Synthetic methanol, precursor of formaldehyde, directed the firm's attention to other plastics, led to the merger of Bakelite Corp. into Union Carbide in 1939. In the early '30's, Union Carbide successfully pioneered the use of petroleum coke in the manufacture of acetylene.

At present Union Carbide is the biggest producer of ethylene oxide and its derivatives. Moreover, it has received certificates of necessity for a $36-million plant at Torrance, Calif., and a $66-million installation at Seadrift, Tex. Both plants will produce polyethylene and other ethylene derivatives. Plans for the Torrance plant, however, which called for completion in two or three years, are believed to have been temporarily shelved. The plant was to have received cracked gases from the nearby General Petroleum refinery and was expected to turn out 50 to 60 million lbs. of polyethylene and 5 to 10 million gal. of ethylene glycol annually.

Carbide is also the biggest producer of synthetic ethyl alcohol. And it's gradually grooming its dynel for a bigger role. Integrating backward, it started making acrylonitrile, raw material for dynel, at Institute two years ago. But it hasn't shied away from forward integration, either. For example, it is one of the two U.S. producers of methyl isobutyl ketone, made from acetone.

Other petrochemical plants include a $1.6-million fluorocarbon resin plant at South Charleston, a large acetylene and HCN-from-natural-gas unit at Texas City, a cumene-phenol-acetone plant at Marietta, O., and a 60-million-lb./year polyethylene plant at Texas City (in addition to the ones scheduled for Seadrift and Torrance).

Expansions in the plastics field also include enlargement of epoxy resin facilities at Bound Brook, N.J., a doubling of its 35-million-lb./year polyethylene capacity at Charleston, and a tripling of butyl chloride facilities at the same place.

It's planning a $1.3-million expansion of herbicide output at Niagara Falls, is just bringing in a mammoth allethrin plant at Institute.

But probably the most spectacular example of the firm's long-range diversification is the coal hydrogenation project at Institute. There, not far from the spot where it initiated commercial production of petrochemicals, it's operating an $11-million pilot plant to get aromatics from coal (*CW, May 10, '52, p. 66*).

Oil Firms' Route

The line of demarcation in petrochemicals between the activities of chemical companies and refiners is very fine—if it exists at all. But their labors are motivated by entirely different reasons. For while chemical companies enter the field to broaden their raw material base, petroleum refiners do it essentially to extract maximum value from their crude oil.

Initially at least, only the largest and most progressive refiners could afford to consider the production of petrochemicals. For one reason, as the refiner penetrated further into the field, problems multiplied, called for more intensive research and development work and for specialized techniques. For another, capital costs increased by leaps and bounds as the refiner ventured farther away from his basic products.

The typical refiner, for example, is accustomed to capital costs for a "complete" refinery of roughly 1¢/lb. of annual capacity. By contrast, the cost of an ethylene plant might be 5¢/lb. Converting the ethylene into a marketable product (e.g., ethylene glycol) could put 7-8¢/lb. on top of that. And making polyethylene may require as much as 23¢/lb. of annual output.

These costs and complex technical problems in addition to the marketing problems encountered have tended to limit the chemical activities of oil companies to fields involving techniques with which they are already familiar: cracking, polymerization, sulfonation, etc. But by the same token, as technology puts more and more of these processes at the refiner's disposal, an increasing number of chemical derivatives are brought within his range.

Here are some major participants among refiners in the petrochemical field and some of the products that are currently within their sphere:

Atlantic Refining. In the petrochemical field, Atlantic's operations have been mainly confined to the production and sale of alkyl aryl detergents. In 1953, it expanded detergent facilities at Philadelphia at an estimated $2 million cost. To support the larger output there, it also bolstered supplies of the base hydrocarbon from its Port Arthur, Tex., refinery.

Last week, Atlantic started up a 30,000-ton/year ammonia plant at Philadelphia. The plant is operating on hydrogen from the hydroforming unit adjacent thereto, which will also turn out 7 million gal. of benzene annually and large amounts of toluene.

Cities Service. Cities Service originated processes of direct oxidation of natural gas, operates a unit at Tallant, Okla., that does just that. With a capacity of about 4 million gal./year, the plant produces methanol, formaldehyde, paraformaldehyde, methyl acetone (a mixture of acetone and higher ketones) and small quantities of acetaldehyde. This year it is bringing in a 10,000-bbl./day unit at Lake Charles, La., to make benzene, toluene and xylenes.

Though Cities Service has shown an active interest in further exploration of the petrochemicals field, no plans are known to have gone beyond the preliminary stage. In 1951, for instance, Cities Service teamed up with Firestone Tire & Rubber to form the American Petrochemical Corp. The jointly held subsidiary was to produce various ethylene derivatives, even received a certificate for a plant. No action has been taken, however, and it seems fairly certain that the two companies have abandoned the whole idea.

Similarly, Cities Service got a certificate of necessity for a $28.5-million ammonia-urea plant near Lake Charles. These plans have not materialized and the certificate has expired.

Continental Oil: Detergents, furnace blacks and aromatics have been Continental Oil's initial petrochemical products. It got its foot-hold in the detergent business in 1946, when it joined Sharples Chemical in

C W Report

setting up Sharples-Continental with an alkylation plant in Baltimore. Subsequently, Conoco bought out Sharples' interests and greatly expanded the capacity of the plant. Tetramer requirements for the Baltimore plant are met by Conoco's Lake Charles, La. and Ponca City, Okla., refineries, which also supply benzene.

Acquisition of the Chicago plant of Stepan Chemical in 1952 gave Conoco a completely integrated operation including facilities for polymerizing, alkylating and sulfonating. Just as important, it gave the firm a wedge in the important Midwest market.

Various grades of carbon black are made by Continental Carbon and Continental Oil Black, in which Conoco has 40% and 58% interests, respectively.

Gulf Oil. Early last year Gulf entered the petrochemical field in a big way: it completed a 10-million-lb./year octyl alcohol unit and a 180-million-lb./year ethylene plant at Port Arthur.

Best guess is that the foreseeable needs of Gulf's current ethylene buyers is on the order of 250 million lbs./year. Significantly, Gulf is proceeding with a substantial expansion already. This would not only help to meet the mounting demands of ethylene (for polyethylene, styrene, TEL and ethylene oxide), but also might provide Gulf with a basis for making its own petrochemicals.

This inclination to integrate forward is pointed up by the formation (in November '52) of the Goodrich-Gulf Corp., a joint enterprise of Gulf and B. F. Goodrich. Although no production plans for the new corporation have been revealed, it's likely that Gulf's ethylene will figure prominently in any program.

Lion Oil: Petrochemicals are perhaps more important to Lion than to any other refiner. Over one-quarter of its income in 1952, for instance, came from chemicals. And this fraction is likely to get bigger, owing to its $31-million plant to make 300 tons of ammonia daily, 250 tons of which will be converted into pelleted ammonium nitrate. The remainder will be sold in anhydrous form.

But despite the importance of chemicals in the over-all corporate structure, Lion has kept its operations pretty much in the agricultural field. Even in that field, it has concentrated on ammonia and its derivatives—aside from a relatively small quantity of by-product from the El Dorado refinery, which is sold as weedkillers, herbicides, etc.

Phillips Petroleum. Until shortly after World War II, Phillips' activities in the petrochemical field centered around synthetic rubber and carbon black. It presently runs the government-owned butadiene plant, and the copolymer unit at Borger, Tex., adjacent to one of its big refineries.

Also at Borger, Phillips runs a carbon black plant estimated to have a capacity of 300 million lbs./year. And it has a half interest in the Texas Elf Co., a channel black producer. (The other half is held by Boston's Godfrey L. Cabot.)

In 1948 the firm entered the ammonia picture by taking a long-term lease on the government's Cactus Ordnance Works at Etter, Tex. Subsequently expanded, the plant can now turn out 500 tons of ammonia per day, as well as nitric acid, ammonium nitrate and nitrogen solutions.

In 1951, Phillips joined with General Aniline & Film and Borden to organize the short-lived Alamo Chemical Co. When the combination was liquidated, Phillips took over Alamo in its entirety, proceeded to build a $29-million, 450-ton/day ammonia plant. This seems to reinforce the "go it alone" approach to petrochemicals that Phillips has preserved, save for the interest in Texas Elf.

Simultaneously with the start-up of the Alamo ammonia plant, Phillips placed onstream a $3-million, 405-ton/day triple superphosphate plant. Also for fertilizers, Phillips built an ammonium sulfate plant using sulfur from two sulfur recovery plants it built near Midland, Tex. Other sulfur-based compounds that Phillips is now making include mercaptans (as synthetic rubber modifiers) and disulfides (as lube and cutting oil additives).

And Phillips' interests in ammonia have not been limited to fertilizers by any means. Last year, it started up a $2.5-million plant to make 2 million lbs./year of methylvinylpyridine (MVP) and 1 million lbs./year of other by-product pyridines. The MVP is understood to have been sold to Chemstrand under a long-term contract (for Acrilan).

Actively carrying on research in petrochemicals, Phillips has recently started pilot-plant production of a high-molecular-weight polyethylene via a low-pressure process.

Shell Oil: With an intense interest in petroleum chemicals that dates back to 1927 when it established a long-range program to utilize such chemicals. Shell has had an enviable post-war petrochemical growth. In the period from 1946 to 1953, for example, sales of its petroleum-based chemicals rose from $23 million to $126 million.

Here's a list of the principal chemical operations by Shell in the U.S.

- Shell Point, Calif.: Actual production started in 1930-31 with the completion of a nitrogen fixation plant at Shell Point (Pittsburg, Calif.). Ammonia capacity was raised—on two occasions—before it reached its present level of 100,000 tons/year. At the same site, Shell produces ammonium sulfate from sludge acid, and a special carbon black.

Late last year Shell started producing ammonia in its new Ventura, Calif., plant, and is currently streamlining its distribution setup to accommodate West Coast customers (*CW, July 24, p. 48*).

- Martinez, Calif.: The year 1930 was also the take-off year for chemical operations adjacent to Shell's Martinez refinery near Los Angeles. Initially, secondary-butyl alcohol was made from normal butylenes on a semicommercial scale. Later, tertiary-butyl alcohol and methyl ethyl ketone were added, then isopropyl alcohol and acetone as well as dimethyl sulfone. Benzene (around 6 million gal./year) and other aromatics are produced from hydroformate. Most recent addition to the product list is para-tertiary butyl benzoic acid.

- Dominguez, Calif.: Chemical plants were opened in 1936 adjacent to the Wilmington-Dominguez refinery, which is also in the Los Angeles area. They not only supplemented the Martinez production, but also carried out further conversion of acetone into diacetone alcohol, mesityl oxide, methyl isobutyl ketone and methyl isobutyl carbinol.

- Houston: In 1940, Shell started to set up chemical shop in Houston. Production there now outstrips that of the West Coast on all items save ammonia. In Sept. '41, it started up a full-scale butadiene plant. Although it was a successful unit, the government didn't accept the Shell process for its butadiene program because of the shortage of chlorine, which is required in the Shell-developed method (chlorination of butylene, pyrolysis of the resulting dichloride).

Also in Houston, Shell started pro-

What Petroleum and Natural Gas Companies Are Doing in Petrochemicals

A. Petroleum Co's.	Operating Subsidiary Manufacturing Chemicals*	Ownership of Operating Subsidiaries	Natural Gas	Basic Chemicals Made From Olefins			Misc. Chem.
				C_2	C_3	C_4	
Atlantic Refining Co.	**	—			Detergents		Aromatics, oxo Alcohols[4] Ammonia
Cities Service Co.	Cities Service Ref. Co.	100% C. S.	Methanol, aldehydes[1] and ketones[1], ammonia[2]				
	American Petrochemical Corp. (1951)	50-50 C.S. & Firestone		Oxide-glycol[3]		Butadiene, GR-S[3]	
Continental Oil Co.	Continental Oil Black Co. (1950)	58% Conoco;					Oil black
	Sharples-Continental (1946)	100% Conoco				Detergents	
	Petroleum Chemicals Inc.	100% Conoco				Butadiene, GR-S[3]	Aromatics
Gulf Oil Co.	**	—	Ethylene				Oxo alcohols
	Goodrich-Gulf Chemicals Corp.	50-50 Gulf and Goodrich		Ethylene derivs.[4]			
Lion Oil Co.	**	—	Ammonia and derivatives				Herbicides
Phillips Petroleum Co.	Phillips Chemical Co.	100% Phillips	Ammonia and derivatives[5] Pyridines			Butadiene, GR-S[3]	Oil black, aromatics, sulfur
	Texas Elf Carbon Co.	50-50 Phillips and Cabot	Channel blacks				
Shell Oil Co.	Shell Chemical Corp. (1929)	100% Shell	Ammonia	Ethyl alcohol, ethyl chloride	Isopropyl alcohol, acetone, diacetone, MIBK, allyl chloride, glycerin, hexylene glycol, epoxy resins, detergent tetramer, and others	Butadiene, GR-S[3] sec. & tert. butyl alcohol, MEK	Aromatics sulfur
Standard California	Oronite Corp. (1943)	100% Standard Calif.			Detergents, cumene, phenol/acetone	Butadiene polybutenes	Aromatics
Standard Indiana	Indoil Chemical Co.	100% Standard Indiana	Alcohols, aldehydes, ketones[7]		Detergents	Polybutenes	Aromatics oxo alcohols
Standard Jersey	**	—		Ethyl alcohol ethyl chloride	Isopropyl alcohol acetone, detergents	MEK, butyl rubber[3] Butadiene	Aromatics oxo alcohols Aromatics
	Humble Oil & Refining Co.	About 72% Jersey					
	Ethyl Corp.	50-50 Jersey, General Motors		TEL			Insecticides
Texas Co.	Jefferson Chemical (1944)	50-50 Texas and Cyanamid		Oxide-glycol and other derivs. and ethylene dichloride			Nonyl phenol
	Coltexo Corp. (Maryland)	49% Texas; 51% Columbian Carbon Co.					Oil black
Union Oil Co.	Brea Chemical Co.	100% Union	Ammonia[6]				Sulfur[9]
Warren Petroleum Corp.	**	—					Pentaerythritol, aldehydes[3] methanol
B. Natural Gas Co's							
Panhandle Eastern Pipeline	National Petro-Chemicals Corp.	40% Panhandle; 60% Nat. Distillers	Ethylene	Ethyl alcohol, ethyl chloride polyethylene[6]			
Tennessee Gas Transmission	Mathieson Hydrocarbon Chemical Co.	Originally 50-50 Tennessee and Mathieson Chemical. Since Nov. 1951 merged into Mathieson		Ethylene oxide glycols			

(1) Small production obtained by oxidation of natural gas. Production is sold to American Cyanamid.
(2) Temporarily shelved.
(3) Company inactive, plans believed abandoned.
(4) Planned.
(5) Originally planned through Alamo Chemical Co.
(6) Under construction.
(7) Methanol, ethanol and other alcohols, aldehydes and ketones obtained from extraction and purification of by-products of Brownsville hydrocarbon synthesis plant. Only period operation and recently shut down.
(8) Companies believed interested in purchase of R. F. C. facilities.
(9) Government owned plants.
* Year of organization of corporation in parentheses.
** No separate subsidiary formed to consolidate chemical activities.

ducing allyl chloride, allyl alcohol and chlorinated propylene. Its synthetic glycerine plant (now being expanded to a capacity of 72 million lbs./year) is the first one of its kind in the world.

Other units at Houston include a 20-million-gal./year plant for synthetic alcohol (made by hydrating ethylene) and plants for acrolein, epichlorohydrin, dichlorhydrin, ethyl chloride, epoxy resins, dodecylbenzene. About the beginning of last year, Shell placed in operation a 15,000-bbl./day naphtha platformer to turn out 19 million gal./year of benzene and 33 million gal./year of toluene. Moreover, it's putting up a 55-ton/day sulfur recovery plant.

• Norco, La. This is the site of Shell's latest venture, a $7.5-million plant to make glycerine precursors.

Standard of California. Like Shell, Standard of California had a long-standing interest in petrochemicals. It developed processes to recover by-products from refinery acids and acid sludges as early as 1912, and it was making crude by-product sulfonates in the early '20s. Not until 1928, however, did it concentrate on the petrochemical field. At that time it set up a program to develop production of solvent derivatives of cracked gases. By 1931, it had received patents on isopropyl, secondary- and tertiary-butyl alcohols. It then turned to methyl, ethyl, propyl and butyl mercaptans, polybutene, purified sulfonates, wetting agents, emulsifiers and rust preventives.

Its interest in petrochemicals was pointed up by the establishment of Oronite (1943) to handle the development and sale of chemicals, and California Research (1944) to carry out work in connection with Oronite's program.

During the war, Standard took over operation of the government's butadiene plant at El Segundo and started making the three xylene isomers in a plant adjacent to its Richmond refinery. Shortly thereafter it pioneered the production of phthalic anhydride from ortho-xylene (instead of naphthalene). Its interest in the xylene family continues, for Oronite is putting up a big plant to separate para-xylene (Dacron fiber intermediate) and meta-xylene (isophthalic acid intermediate) and to produce isophthalic acid.

The firm operates plants at Richmond, Calif., and Oak Point, La., to make alkyl aryl sulfonates and phenates. These plants also have facilities for lube oil additives.

Early this year, Standard started production of pheno from cumene at its $4-million (estimated) unit at Richmond. Just about a year previous to that, it completed a platformer at El Segundo capable of making 13 million gal. of benzene and 49 million gal. of xylene yearly.

Standard Oil of Indiana. Standard of Indiana organized the Indoil Chemical Co., a firm that was to have operated on by-products from the Carthage Hydrocol plant at Brownsville, Tex. Because the Brownsville plant didn't live up to expectations, the Indoil plant never got into full production. The Standard of Indiana group, however, will soon reactivate the Carthage Hydrocol project.

Present activities of the company include the manufacture of octyl alcohol at Wood River, Ill., synthetic aromatics, detergent intermediates, and polyisobutylene. It's also planning facilities for separating para-xylene at its Whiting refinery.

Standard Of New Jersey: Standard of Jersey is a pioneer in petrochemicals, but it's anybody's guess whether or not it's currently bigger than Shell in the field. However, there's a considerable difference in the approach the two have taken. Whereas Shell has shown a pronounced tendency toward vertical integration and has not shied away from tricky syntheses, Jersey Standard has generally not gone beyond "products of the first conversion."

In any case, the company is a big producer of both aliphatics and aromatics. It introduced the oxo process in this country and makes various copolymers of butadiene. But the most outstanding development of the firm in petrochemicals is the butyl rubber process. Although originally confined to use in inner tubes, the butyl rubber is fast finding other outlets.

With General Motors, it is joint owner of the Ethyl Corp. It's also a big source of detergent raw materials and one of the most prominent firms in the lube oil additive field.

The Texas Co. Outside of its joint ownership of Jefferson Chemical, The Texas Co. has a 49% interest in Caltexo, a carbon black producer. (Majority interest is held by Columbia Carbon.) It had a major interest (41.51%) in Carthage Hydrocol.

Union Oil. In 1952, Union organized the Brea Chemical Corp. (*CW, July 24, p. 14*) to consolidate its interests in petrochemicals. Its first project involves a $13-million, 200-ton/day ammonia plant at Brea, Calif. Brea also markets Union's sulfur and ammonium sulfate, and is scheduled to build a sulfur recovery plant near the parent's Oleum, Calif., refinery.

Warren. The latest oil company to enter the petrochemical picture, Warren Petroleum, is finishing a plant on the Houston Ship Channel that will exploit a hydrocarbon oxidation process developed by the firm. It will convert propane, butane or their mixtures into pentaerythritol (2.5 million lbs./year), methyl alcohol (4 million lbs./year), acetaldehyde (2 million lbs./year), and smaller quantities of other chemicals.

Warren is also one of many participants in the proposed, privately financed butadiene plant in the Southwest (*CW Newsletter, July 10*).

Rubber Companies' Route

The U.S. rubber industry has become the largest single consumer of petrochemicals, which form the basis of synthetic rubber, plastics and many other products. The best available estimates indicate, in fact, that on a tonnage basis, 20% of entire U.S. production of petrochemicals went to the rubber industry in 1952. Styrene, butadiene and carbon black, of course, accounted for most of this figure.

And retail stores owned by the rubber companies provide significant outlets for petrochemicals like ethylene glycol and methanol antifreezes.

Since the majority of the raw materials used by the rubber industry can be made competitively from petroleum in virtually all cases, it's reasonable to expect that rubber companies will assume a bigger role in the field.

As yet, however, diversification among the major rubber companies has for the most part been in the fields of rubber products (still the mainstay of their business) and into rubber-related products through which the compounding and fabricating techniques of the rubber industry can be put to good use.

But particularly in recent years, the rubber companies have exhibited a stronger urge to make chemicals. They've found that rubber chemicals, like anti-oxidants and accelerators, often have lucrative outlets elsewhere. Many of these, for instance, have found markets as pesticides.

When the synthetic rubber plants

What Rubber Companies Make and How They Can Be Derived from Petroleum

PRODUCT	Principal Tradenames: Goodyear	Goodrich	Firestone	U. S. Rubber	Intermediates		Basic Petroleum Raw Material
A. ELASTOMERS							
GR-S[1]					Styrene (20-25%) Butadiene (60-75%) Oil extender (up to 25%) Carbon black	Ethyl benzene n-butylene or butane	Ethylene and benzene BB fraction Aromatic oils Natural gas or aromatic oils
Butyl rubber (GR-1)					Isoprene (2-5%) Isobutylene (95-98%)		Isoprene BB fraction
GR-N	Chemigum	Hycar OR	Butaprene	Paracril	Butadiene Acrylonitrile	n-butylene or butane Acetylene or ethylene	BB fraction Natural gas, ethane, propane or ethylene
Polyester rubber (Vulcollan type)	Chemigum S. L.[2]				Modified polyester	Ethylene & propylene glycol, adipic acid and naphthalene-diisocyanate	Ethylene, propylene, cyclohexane
Sundry rubbers	Pliofilm (chlorinated rubber)	Hycar OS* (also lactoprene acrylic rubbers)					
B. RESINS (Plastic film, latexes, etc.)							
Styrene-butadiene	Pliolite, Pliotuf	Goodrite 50	Butaprene S. L. & 5D, Tuflite	Kralac	Styrene (60-90%) Butadiene (10-40%)	Ethyl benzene n-butylene or butane	Ethylene and benzene BB fraction
Butadiene-acrylonitrile	Pliobond				Butadiene Acrylonitrile	n-butylene or butane Acetylene or ethylene	BB fraction Natural gas, ethane, propane or ethylene
Vinyl chloride (P.V.C.)	Pliovic	Geon 100 Koroseal	Exons	Marvinol	Vinyl chloride monomer	Acetylene or ethylene	Natural gas, ethane, propane or ethylene
V.V. chloride copolymers	Plioflex	Geon 200	Velon, Velofilm, Veloflex		Vinyl and vinylidene monomers	Acetylene or ethylene	Natural gas, ethane, propane or ethylene
Acrylonitrile styrene	—	—	—	Kralastic, Royalite	Acrylonitrile Styrene	Acetylene or ethylene Ethyl benzene	Natural gas, ethane, propane or ethylene Ethylene and benzene
Acrylonitrile isobutylene	—	—	—	Kandar	Isobutylene Acrylonitrile	Acetylene or ethylene	BB fraction Natural gas, ethane, propane or ethylene
Soil conditioner resins	—	No trade name	—	—	Polyacrylonitrile	Acetylene or ethylene	Natural gas, ethane, propane or ethylene
Synthetic leather (a) styrene-butadiene	Neolite	—	—	—	Styrene butadiene resin blended with rubber		
(b) vinyl base	—	Koroseal	—	—	Plasticized P.V.C.	Ethylene	
Sundry resins	—	—	—	Vibrin	Styrene and a polyester		
C. SUNDRIES							
Permanent antifreeze[3]	—	—	—	—	Ethylene glycol	Ethylene oxide	Ethylene
Volatile antifreeze[3]	—	—	—	—	Methanol	$CO + H_2$	Natural gas or heavy oil

[1] Made at government plants.
[2] Thus far, experimentally only.
[3] Not at present made by rubber companies, but sold under their brand name through their retail outlets.
* 50-50 Copolymer of butadiene and styrene.

are sold to private concerns, it's extremely likely that the rubber firms will show an even more lively interest in chemicals and petrochemicals.

Rounding them Out: Not to be overlooked in any consideration of petrochemical companies are the relative newcomers, National Petro-Chemicals Corp., W. R. Grace and Deere & Co. National Petro-Chemicals, the joint offspring of National Distillers Products Corp. and Panhandle Eastern Pipe Line Co. made a big splash last fall *(CW, Nov. 21, '53, p. 26)* with the opening of its $50-million Tuscola, Ill., plant for making ethylene and ethylene derivatives.

Both Deere and Grace are planning to make ammonia by the partial oxidation of natural gas and to convert the ammonia into urea *(CW, Aug. 30, '52, p. 28)*.

Parallel but Independent: In a field that's as broad and complex as the petrochemical industry, it's all but impossible to find generalizations that will fit all cases. It does seem quite clear, however, that in many respects, the petrochemical activities of petroleum and chemical firms have taken place along parallel—though generally independent—lines. Tie-ins and joint ventures have been the exception rather than the rule.

And notwithstanding the rather wide overlap between the two members of the process industries, they've tended to supplement rather than to crowd each other. Their combined efforts have created a new industry —one that embodies some of the more dynamic attributes of both.

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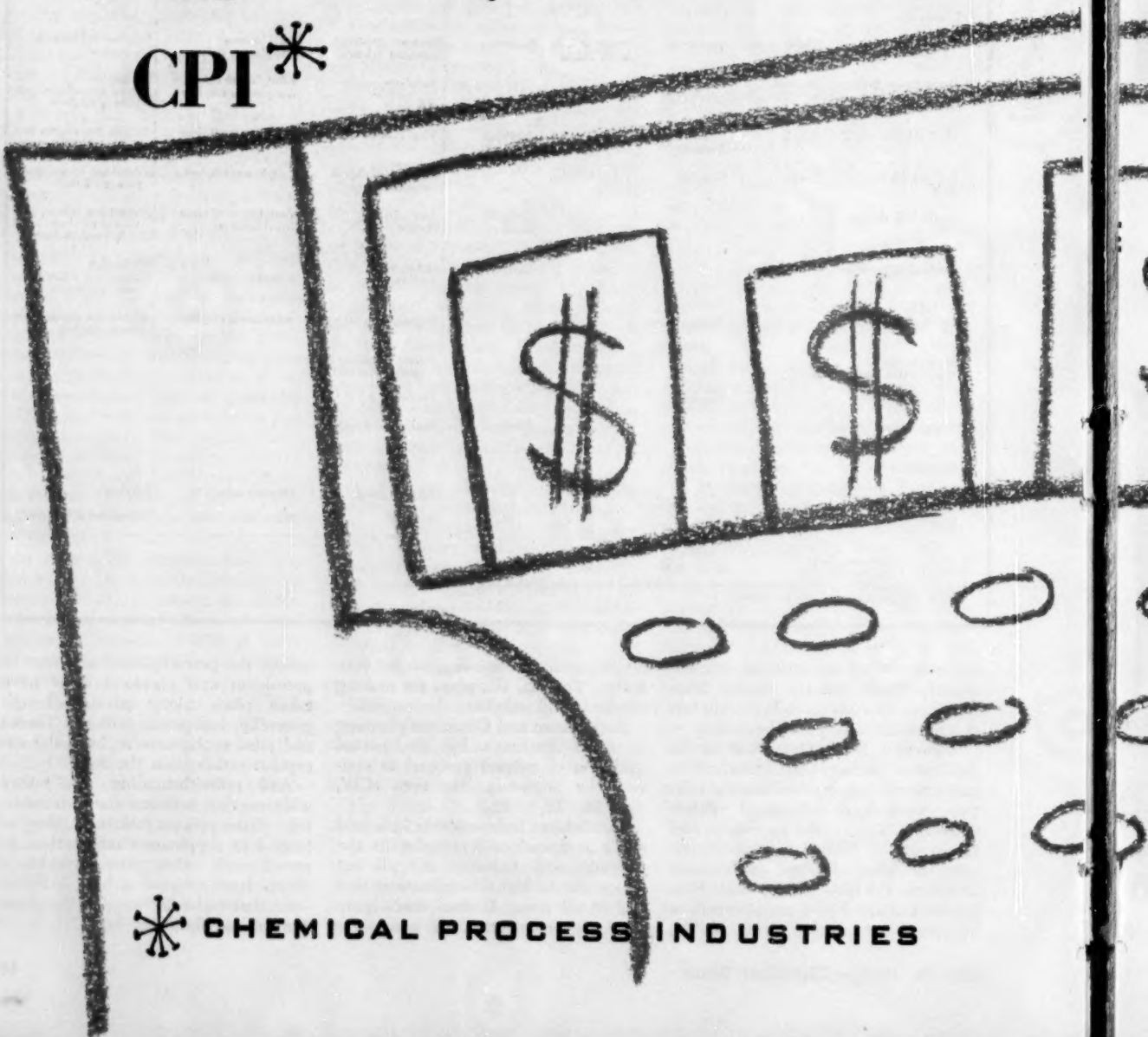

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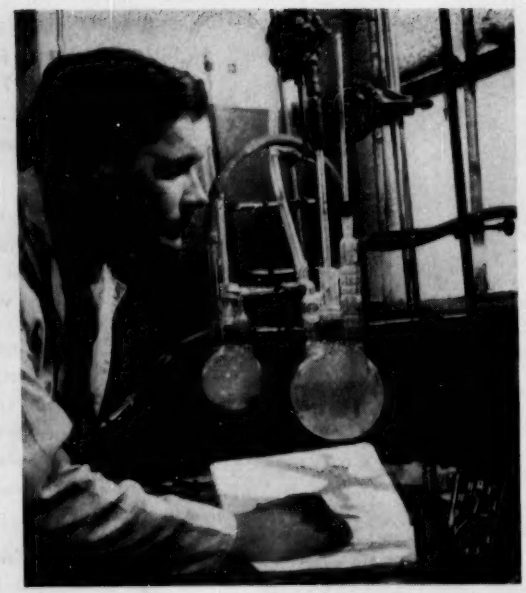
IN PREPARATION for production run, Treplow President Jack Wolpert briefs son Alan (left), chemist Thomas Risseeuw (right) on new sulfonation operation.



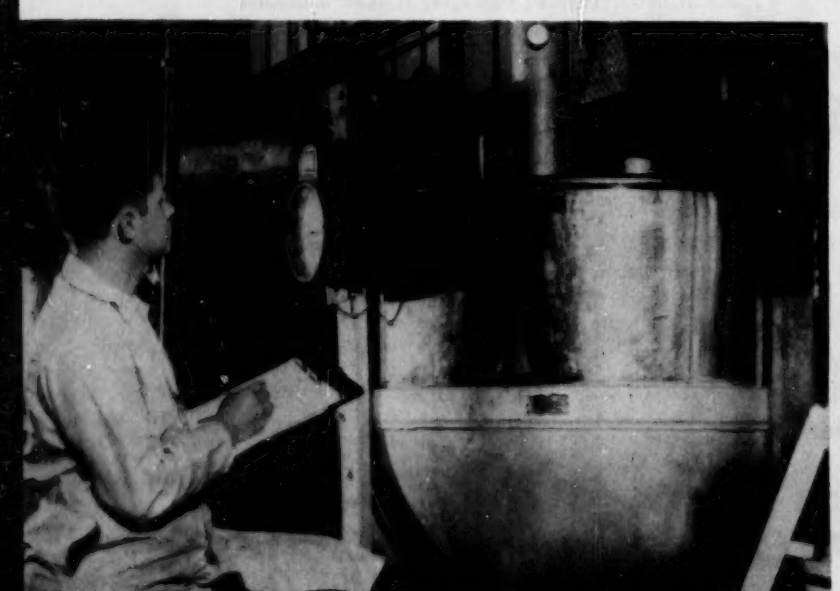
CHEMIST RISSEEUW, in follow-through, checks procedure out in laboratory while . . .

Fashioned for Purity

Had Ninol Laboratories (Chicago) looked over its shoulder last month *(CW Newsletter, June 26)* as it went into full-scale production of salt-free detergent sulfonates, it would have found that it was no longer alone.

Using a similar one-step sulfonation, Treplow Products, Inc. (Paterson, N.J.) has joined Ninol in its bid for a lush $100-million-plus detergent market; and looking over Treplow's shoulder, the CW CAMERA toured the Paterson site last week, got a first-hand view of the novel operation.

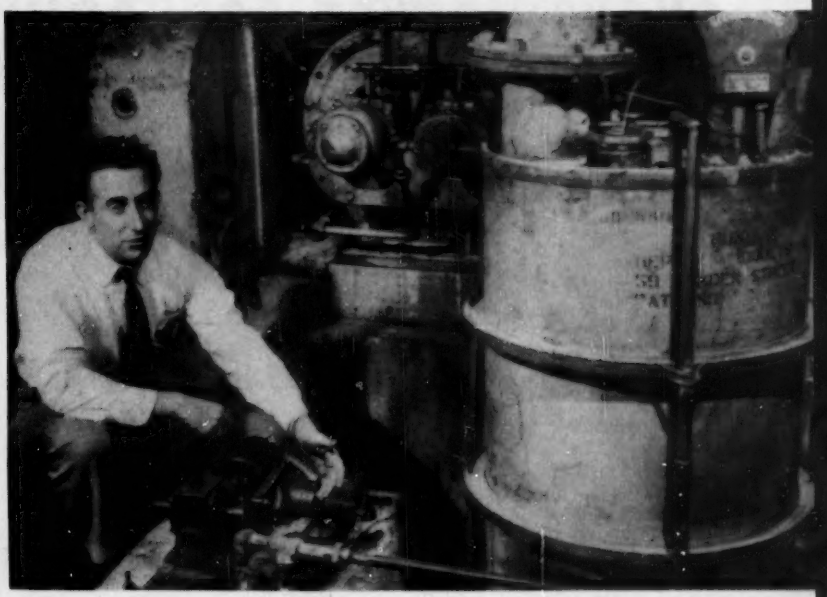
Key to both the Treplow and Ninol processes is sulfonation with stabilized sulfur trioxide rather than conventional oleum. It yields a high-purity prod-



VAPORIZED SULFAN-AIR mixture is sparged into jacketed stainless-steel reactor, reacts exothermically with organics charged from storage.

PRODUCT stream is recirculated through cooling tower as Wolpert checks temperature.

. . . Vice-President Wolpert notes weight of Sulfan feed drum, then starts operation rolling.

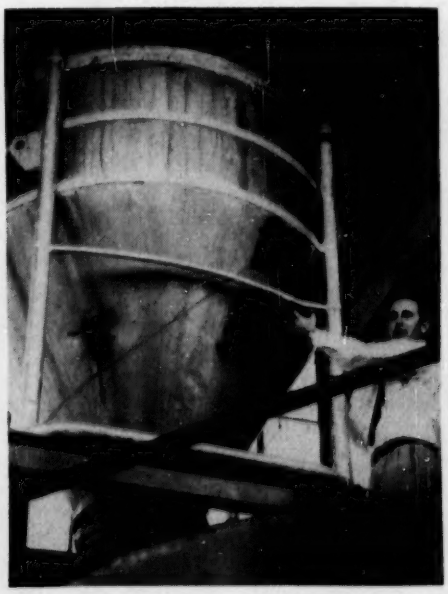


PROPORTIONING PUMP meters Sulfan out of drum into flash vaporizer (right) where it is mixed with recycled air from blower (in background).

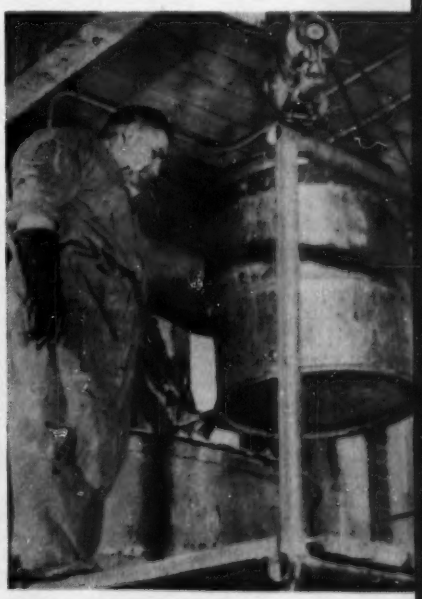
uct and a compact, efficient operation; both are generating a great deal of interest among detergent makers. But the bigger detergent makers aren't rushing to scrap their sizable investment in conventional sulfonating equipment—at least, not until the operation proves out.

Process Blueprint: By the same token, Ninol and Treplow reasoned that with the giants already in the surfactant field, there wouldn't be room for a small company* unless it could come up with a new method that would give it some competitive leverage. Searching for such a method, the firms hit upon the idea of sulfonating aryl alkylates with liquid sulfur trioxide. But the trioxide's tendency to polymerize to the asbestos-like, explosive alpha isomer proved discouraging until General Chemical introduced its Sulfan (the gamma form of sulfur trioxide stabilized with

* Present active sulfonic acid capacity is 10 million lbs./year for Ninol, 5 million lbs./year for Treplow.



AFTER complete sulfonation, charge goes to storage hopper above neutralizer.



FROM neutralizer, sulfonates feed to drum drier (left); or to blenders (right) for custom formulation; liquid surfactants go directly into shipping drums.

HOW THIS COMPACT

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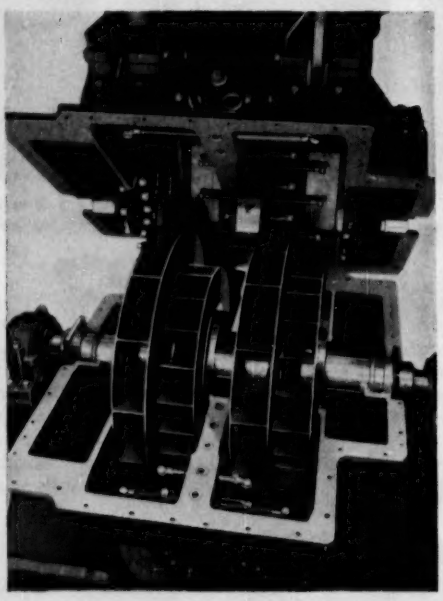
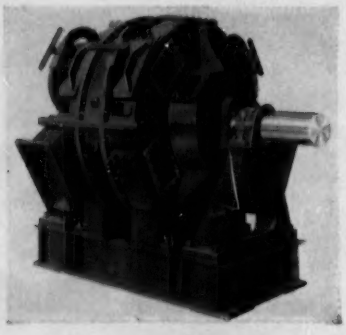
"BUFFALO" ROTARY MULTI-STAGE GAS SCRUBBER

In the photo at right of a "Buffalo" Rotary Multi-Stage Gas Scrubber with upper casing lifted, you see a cyclonic gas scrubbing chamber which is ideal for removing easily wetted or slightly water-soluble dust particles. Where tar vapor, lampblack or metallic fumes are present to the extent of 5 to 10 grains per cu. ft. of gas, cleaning effects down to .006 grains per cu. ft. are being averaged in use.

Gas with its dust content is sprayed as it enters one side of the wheel. Wet scrubbing action takes place as the wheel revolves. Cleaned gas is discharged from the "inlet" of the other wheel. This "Buffalo" Scrubber is the only small-space unit to handle many of today's requirements for low but toxic initial loadings. Since every job must be analyzed separately, you are urged to write our Engineering Dept. concerning your own specific air or gas cleaning problem. Their long experience is at your disposal.





FOR REMOVING TAR VAPOR—LAMPBLACK—METALLIC FUME— "Buffalo" Rotary Multi-Stage Gas Scrubbers have proven the ideal answer to low-volume requirements in the metallurgical and processing industries. Write for Bulletin AP-425 for details on these extremely sturdy units for high cleaning efficiency.

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less than 0.5% boron compounds).

With the cooperation of General, Ninol was the first to develop a commercial operation (*CW, Sept 20, '52, p. 38*), feels that it has an edge in know-how and is, at least for the time being, keeping details confidential. Essentially, however, its operation is similar to Treplow's which works like this:

Liquid sulfur trioxide, received in black iron drums, is stored at 90 F in insulated, temperature-controlled bins. At the start of the operation, the trioxide is transferred to a feed drum (also insulated and thermostatically controlled) atop a platform scale that is used to check rate of feed.

From the feed drum, a proportioning pump meters the trioxide into a stainless-steel vessel where it is flash-vaporized at 125-145 F. (In place of metered feed, it is understood that Ninol completely charges the vaporizer with trioxide at the start of each run.) Recirculated air is blown into the flash vaporizer, mixes with the gaseous trioxide in an air-Sulfan ratio of 10-11:1. (Ninol keeps the ratio down to 9:1, uses nitrogen in place of air, and discharges spent nitrogen to atmosphere instead of recirculating it.)

A high-velocity nozzle sparges the vaporized Sulfan-air mixture into a water-jacketed stainless-steel vessel where it reacts exothermically with the aryl alkylate previously pumped in from storage. A rotary pump recirculates the reaction mass through a heat exchanger (which removes excess heat) back into the reactor until sulfonation is complete as indicated by weight of Sulfan metered from the feed drum. Temperature is critical, must be closely controlled to maintain proper viscosity and to prevent harmful color degradation. Treplow's future plans call for a system to recirculate cooling water through the exchanger in order to provide closer control as well as to reduce total water consumption.

Once sulfonation is complete, the charge is diverted from the heat exchanger, channeled to an overhead storage hopper, which feeds into underlying glass-lined neutralizers. Depending upon the desired product, either triethanolamine or 50% caustic soda is piped in from storage to neutralize the sulfonic acid. From the neutralizer, the sulfonate stream is channeled along one of three possible routes: liquid detergents go directly to shipping tanks; specialties to blenders for individual tailoring first; or solid detergents to a drum drier

where they are flaked or powered preparatory to shipment.

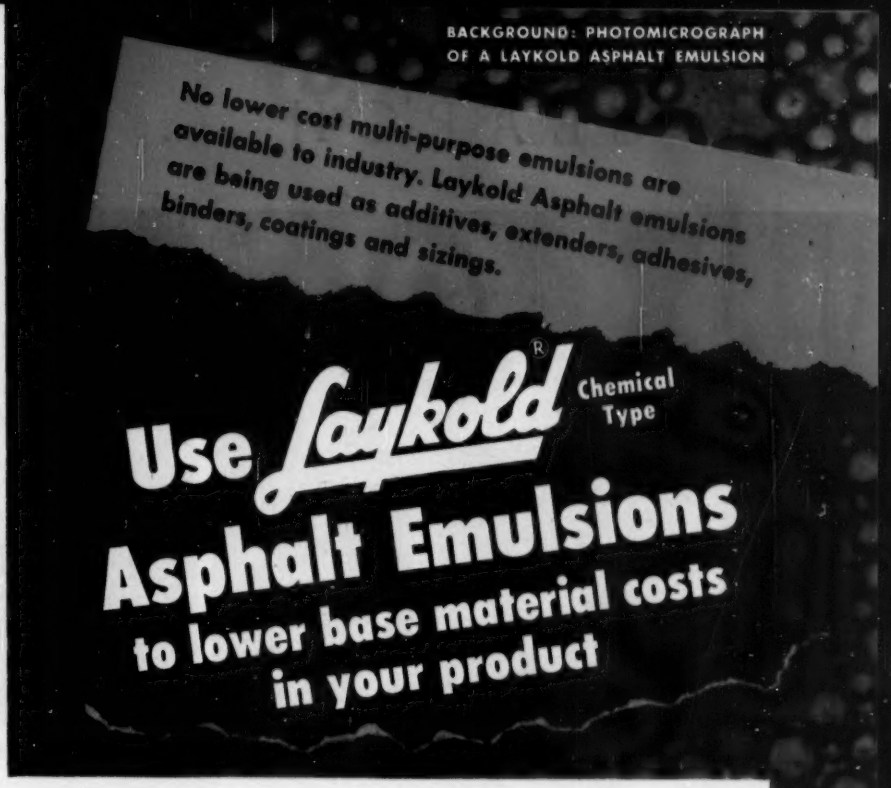
Second Look: At first glance, the simplicity of the operation belies the ingenuity with which some knotty process problems were solved. Silica gel air trains, for example, were devised to keep moisture from entering the Sulfan feed drum, turning the trioxide into its explosive alpha isomer. To keep corrosion at a minimum, stainless-steel equipment, Teflon gaskets, and welded fittings were resorted to wherever possible. Temperature controls had to be set up to prevent the process stream from solidifying (Sulfan "freezes" below 63 F), discoloring, charring, or decomposing.

Some kinks, of course, are still not completely straightened out; but, more significant, both Treplow and Ninol feel that the returns have already justified the investment of time and capital, that the use of liquid sulfur trioxide as a sulfonating agent in place of sulfuric acid, chlorsulfonic acid or even oleum has some very real advantages:

- Reactants combine in exact molecular proportions, no water is formed, no excess acid remains to be neutralized. (With oleum a 20% excess is required to drive the reaction to completion, and a mole of water is formed for every mole of sulfonate. Not only does this entail a material loss; it also poses a waste disposal problem.)
- Liquid sulfur trioxide is a more powerful reagent than oleum; consequently a smaller amount is required, and smaller equipment can be used. Too, reaction times are faster, permit more batches to be run in same amount of time.
- Product purity is higher, runs close to 95% active ingredient—less than 3% salt as compared with products via conventional sulfonations that sometimes run as high as 60%, seldom less than 15%, salt.* This comparative absence of salts, of course, will allow formulators to make more concentrated detergents, incorporate a higher percentage of phosphates and other builders.

Currently, Treplow is sulfonating dodecylbenzene and lauryl alcohol for use in salt-free detergents, but that last advantage could provide a springboard into streams as divergent as pharmaceuticals, lubricant additives, and cosmetics, to name a few. And while neither Ninol nor Treplow are willing to discuss future plans in detail, they do not deny that all organic sulfonations—including those heretofore considered commercially infeasible—are fair game.

* Without adding costly solvent extraction equipment.


BACKGROUND: PHOTOMICROGRAPH
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4. A costly *latex emulsion adhesive* was easily extended with a compatible low-cost emulsion product.

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6. Both the wet and dry strengths of a variety of *paper products* were greatly improved and costs lowered by the addition of Bitusize asphalt emulsions.

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4:00 Flashing identification, Milburn starts night watch.

4:30 He makes rounds, checks instructions with researchers.

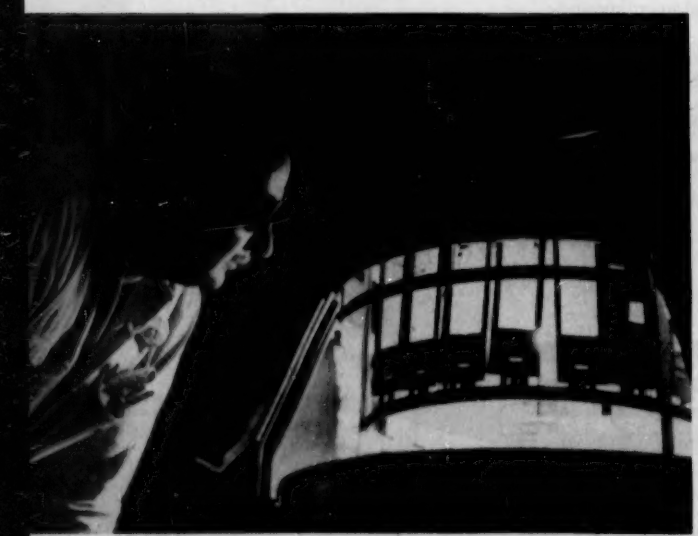
One-Man Night Shift Saves the Day

Chemical reactions unfortunately can't tell time. It's unfortunate because there never seem to be enough daytime hours, and very few researchers relish the prospect of sitting up half the night with a bubbling three-necked flask.

This familiar laboratory conflict is traditionally resolved in one of three ways. The unlucky chemist: (1) stays late, (2) leaves a note of instruction for the night watchman and keeps his fingers crossed, or (3) turns off the burner and lets everything ride until morning. None of these courses is likely to be wholly satisfactory.

A fourth alternative—the night lab assistant—is working out well for a number of busy research laboratories. It's not a new idea, having been in force for a considerable period in such prominent companies as Allied Chemical & Dye, Monsanto, and Union Carbide, among others. But it's a plan that right now is getting further serious consideration from a covey of research executives seeking ways to trim project time, boost their researchers' productivity.

Very simply, the system involves the services of a man who patrols several laboratories, keeping a sharp eye on active setups for a full eight-hour shift after the regular crew has gone. He comes on the job at 4 p.m. to familiarize himself with the night's requirements, is relieved at midnight by a colleague who holds the fort until 8 a.m.



8:45 Milburn checks plasticizer lab Weather-O-Meter.

11:30 Near end of lonely shift, guard is welcome sight.

5:20 Jobs like watching flask-heat keep him busy until . . .

8:00 . . . mid-evening break for lunch in plant cafeteria.

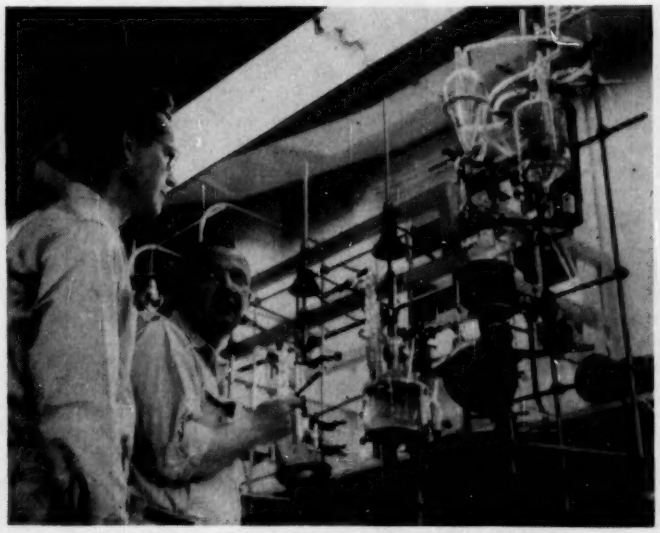
Advantages of this plan are apparent. First and most important, it largely does away with long and exhausting nighttime vigils by staffers who have put in a hard day's work. In like fashion, it guarantees that long-term reactions (e.g., 12, 16, 24 hours, or more) are run continuously from start to finish and not broken up into a series of shorter periods to fit the working day. This is not only good for the reaction, but also it speeds results and saves the day for more fruitful labor. One firm, which recently inaugurated the system, claims it has tripled the efficiency of its staff.

And from a pure dollars-and-cents standpoint, it makes good sense to spare well-paid research people the necessity of performing routine tasks that are easily handled by technicians. Moreover, by taking the tedium out of many dull procedures, the method reduces the probability that such procedures will be circumvented.

Implicit in most of these virtues is a morale-boosting factor that, over the long haul, may prove just as important to the research organization as up-to-date apparatus and a spacious well-designed laboratory.

Success of the system obviously depends upon the man holding down the job. What kind of individual should he be? Most laboratory heads, experienced in the plan, prefer a man of nonprofessional status. They look for intelligent, reliable people (of lab assistant caliber) who can carry out precise instructions without cutting corners or improvising on the routines in any way.

Such a man is Albert Milburn, night laboratory assistant at Monsanto's John F. Queeny plant. A solid member of the company's research team, Al Milburn has efficiently performed his nocturnal duties for a score of years. His nightly patrol is captured, hour by hour, on these pages.



11:45 Last duty: Milburn briefs early-shift man.

12:00 Heading home, he finishes "day" with chat at gate.

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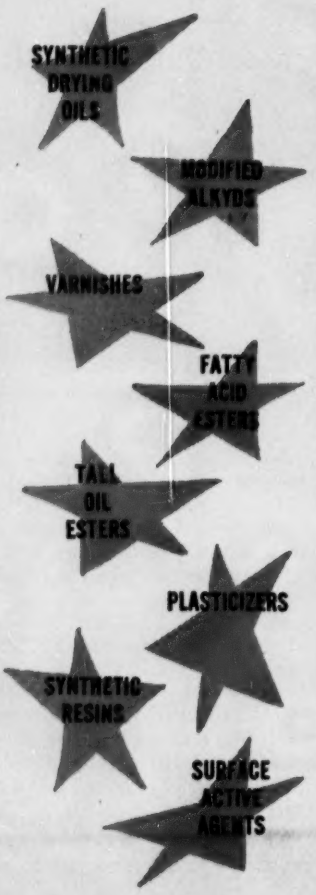

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Skinning the Dragon

A new synthetic fiber is now emerging from its research shell. A polymer of tetrafluoroethylene, it's still in the experimental stage of development at Du Pont. But limited quantities of the tough new fiber are becoming available under the company's Teflon trademark.

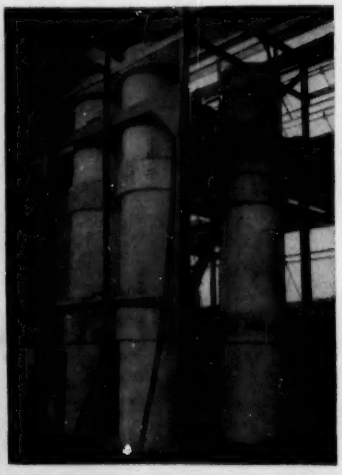
Dubbed "Dragon Fur" by the first chemists who came up against its unusual resistance to heat and chemicals, the fluorinated fiber is aimed at a string of potential uses that show a need for its strong points. Included in this category are process applications —filter fabrics, pump packings, valve diaphragms, protective clothing, etc. —as well as a covey of consumer and specialty uses—fishing lines, surgical and sewing thread, laundry press covers, etc.

Here are the qualifications cited in support of these ambitious claims by Du Pont textile fibers people:

- High strength: the Teflon fiber has about 75% of the tensile strength (on a volume basis) of commercial textile-grade nylon; on a weight basis it's claimed to be about 1½ times as strong as wool.
- Outstanding heat resistance; although the product softens at high temperatures, it is said to retain useful strength up to better than 400 F.
- Excellent chemical resistance: Teflon is reported to be affected only by fluorine, chlorine trifluoride (under pressure) and molten alkali metals.
- Lowest coefficient of friction, highest water repellency and least affinity for adhesives "of any fibrous material."
- Extremely high flex-abrasion durability (freedom from brittleness) at elevated temperatures and under adverse chemical conditions.

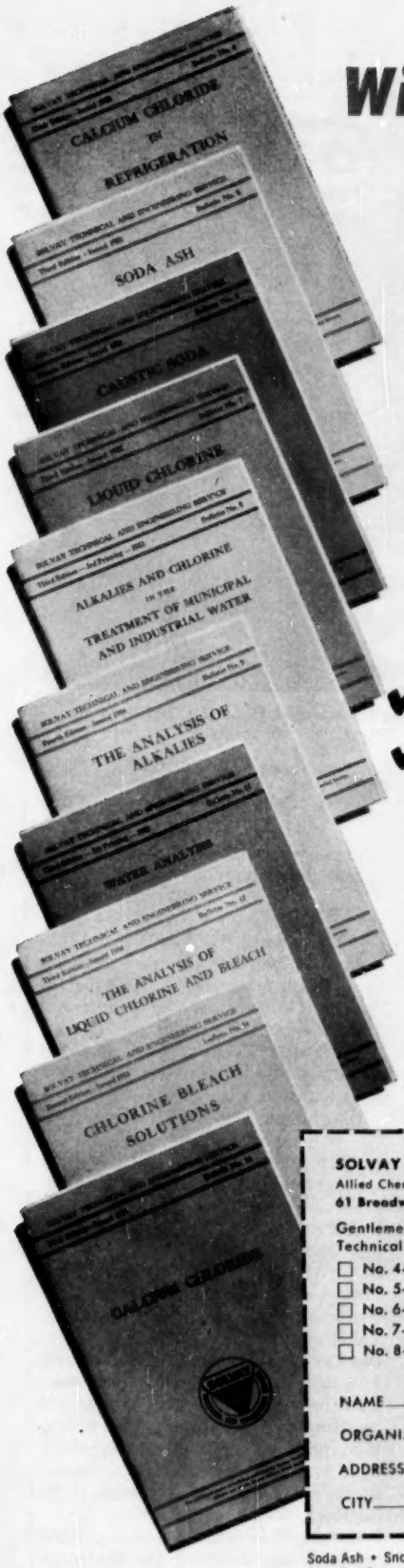
Moreover, avers Du Pont, the new fiber may be handled on conventional textile equipment. Right now what little fiber there is available may be obtained only as continuous filament yarn.

If commercial reception measures up to the company's hopes, a staple fiber may be introduced at some future date. In either case, cost (pegged to the cost of Teflon resin) will be a not inconsequential hurdle.



Ready to Start "Perking"

THERE'S LITTLE resemblance between the battery of gleaming glass (*left*) and the trio of stone columns (*right*), but they are really different versions of the same thing. Contained in Kennecott Copper Corp.'s new (to be dedicated Aug. 13) $1.25-million Salt Lake City research center, they are, respectively, laboratory and pilot-plant apparatus for percolation-leaching of ores from low-grade sources. Each of the two big columns holds one ton of waste rock; they're expected to yield valuable data on the percolation process. The center, slated to tackle all problems arising from Kennecott's Western mining operations, is located on the University of Utah campus, provides 40,000 sq. ft. of space (in a three-story structure).



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Westward Shift in the Perfume Center

To start with a low-cost raw material, and end up with a product that sells for half the price of competitive items is a worthy objective in itself. Yet, when an American chemical firm unveiled its process of making rhodinol a few weeks ago,* it was more than a smart move for an alert company; it points up the increasing importance of the U.S. as a center of perfume- and flavor-base chemicals.

Within the past 20 or so years, the U.S. has taken on prime importance in three areas of "aromatic" (in the perfumer's sense) chemistry: as a consumer of perfuming products, as a producer of odoriferous synthetics, and as a leading researcher in applications of perfuming agents to industrial products.

As a result, this country has become a leading consumer of such plant oils as vetivert, spike, rosemary, petitgrain, lavender-lavandin (although England is best known for lavender scents, its consumption has fallen behind ours), produced in 50 to 250 ton/year quantities. And low-cost essential oils (citronella oil and lemon grass oil, to name two) now find their major market here. They're used as starting points for a number of synthetically made perfume "compounds," and in the past five years, this country has imported an average of 2.8 million lbs. of citronella oil, and 760,000 lbs. of lemon grass oil.

(Recently, too, Russia has become much more interested in buying essential oils. Its industry is now turning out perfumes in quantity, if not quality.)

Moreover, the soap and sanitary specialty fields, which once consumed the bulk of perfume bases, are no longer alone as tank car consumers of "aromatic" chemicals. The petroleum industry, almost as shy about admitting to perfume and deodorant use as most men, has started pouring masking agents and deodorants into fuel oils, for instance.

The rubber and the paint industry (for both water- and oil-based coatings) have become big consumers of perfume chemicals, as has the plastics industry.

Soaps and detergents, however, are still pre-eminent as perfume customers. The advent of synthetic detergents has strengthened this position, for syndets demand more skill in odorization. They require roughly 1 lb. agent/1000 lb. detergent.

The business of selling to industry in general is relatively new—Givaudan-Delawanna's industrial program (now handled by its Sindar Corp.) was one of the first, and it's scarcely 20 years old.

Nonetheless, the increasing applications of perfume chemicals has not done much to change the attitudes of the firms toward revealing facts and figures on the industry. Though growth has been clearly apparent throughout the industry, as indicated by expansion, virtually no figures on sales volumes are available. Most of the companies, closely held, do not publish annual reports, and Dept. of Commerce figures on essential-oil imports don't tell the whole story.

Better Smelling Masses: More than just being number one as a consumer of perfumes industrially, the U.S. has developed into a market for some particular types of personal products. There's an attitude here that everyone has the right "to smell good," and as a result, perfume sales aren't confined to the wealthy class as they are in Europe. A typically top-selling U.S. product is toilet water. More than a diluted perfume, it demands special fixatives, special products to reinforce odor qualities.

As might be expected, too, where products are designed for the mass market, there has been an emphasis

* Shulton, Inc. converts citronellol into rhodinol with ultraviolet light *(CW, July 10, p. 80.)*

in the U.S. on lower-priced raw materials. In some ways, these substitutes don't match naturally produced fragrances. But they can fool nearly all but the trained perfumists,* and boast these advantages: lower in cost, of standardized quality, and of stable supply.

Some firms emphasizing snythetics are Givaudan, Rhodia, Shulton, van Ameringen-Haebler, and Verona Chemical. A few others best known for work with natural products are Dodge & Olcott, Fritzsche Bros., Norda, and Schimmel. Most have outstripped parent firms in Europe in making new fragrances, flavors.†

Continued advancement in perfume synthesis has proved so worthwhile that it's estimated that probably not more than five top-quality personal perfumes today are entirely natural—don't have some synthetic to enhance some quality.

Natural Base: Important as synthetics are, they are but one of the factors affecting price and use of natural products.

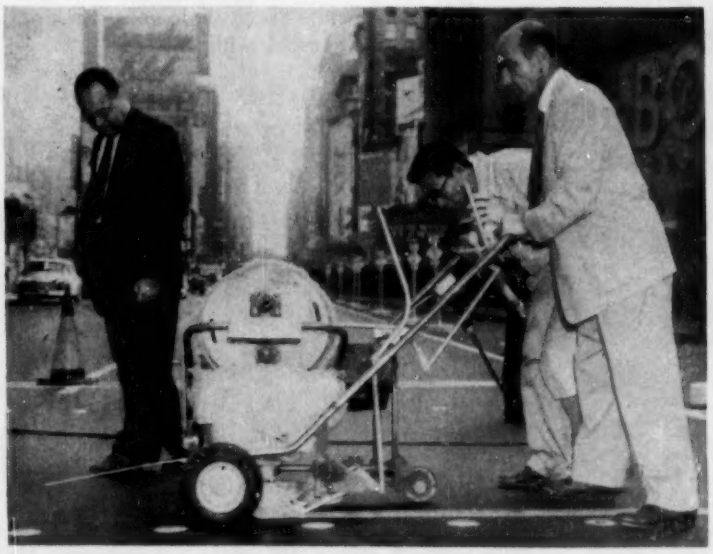
Just as salient to the production of natural essences are such unpredictables as weather, labor costs and availability. In addition, most plants require specific climate and soil conditions.

Labor costs, on the rise throughout the world, has almost ruled out the U.S. as a source of many essential oils, with the exception of those from plants that can be mechanically picked. Locating suitable areas for growing essential-oil plants has occupied a major portion of the life of Fritzsche Bros.' Ernest Guenther.

France—which, with its possessions, is the major source of essential oils—has had its problems with labor. In the Grasse area, where the fabulously valuable jasmin and rose oils are produced (*see cut*), there is competition for the labor supply from nearby Riviera towns, which pay

* No perfume chemist will say, however, that most of his synthetics can touch the natural products in all those qualities that he uses to describe odors—"top notes," "roundness," "depth," etc.

† Some U.S. firms like Monsanto and Dow (and formerly Du Pont, whose perfume interests have been acquired by Rhodia, Inc.), have turned by-products into synthetic fragrances, and have sidled into the business that way.



Plastic on the Pavement

HOT AND THICK, a new alkyd resin striping compound is applied directly to the pavement at New York City's busy Times Square. The product, Veon, is made by Broadway Maintenance Corp. (Long Island City, N.Y.) and comes in red, white, and yellow. One claim is that it can be laid between traffic light changes and that there is no "pickup"—no damage to the marker lines by this immediate use. The company also says the lines are kept clean by auto tires—they serve as "erasers." New York's Traffic Commissioner W. T. Wiley (shown looking on) reports the compound stands up four times better than the best available traffic paint.

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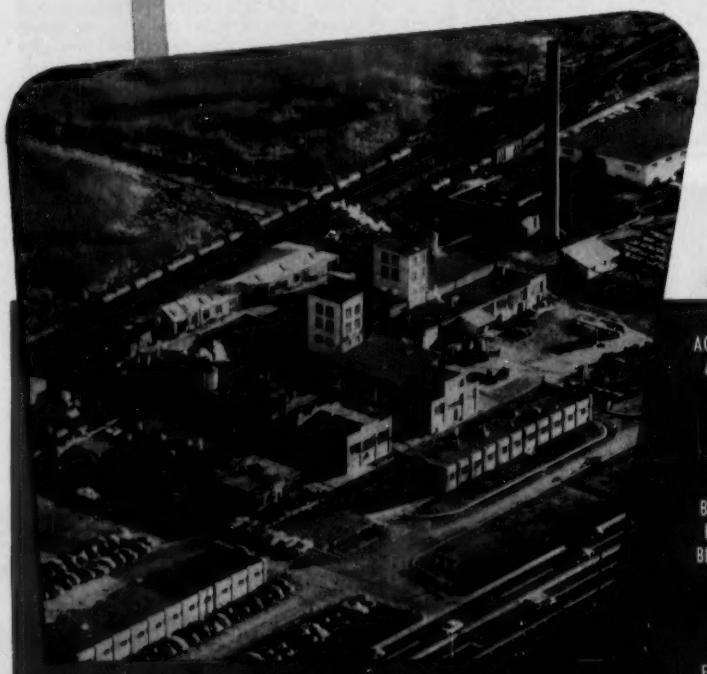

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INTERMEDIATES DIVISION

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(incorporated 1933)

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a little higher wage rates than flower growers.

Too, Grasse has suffered in another way. Until the last war, it was the selling center for all types of natural essential oils. Even those grown elsewhere were contracted for there. Now, purchasers go directly to the producing countries, and bargain there.

In many ways, the essential-oil business has not changed from the practices of a century ago. In the Grasse area, almost all houses have been family-held for years. When one firm pulls out, its facilities are taken over by others already established in the area. U.S. firms—with a few exceptions—have tie-ins with French firms.

Thus, U.S. companies can get necessary Grasse perfume ingredients. They can't, however, step in with their substantial buying power and corner the market on any one oil—French firms have a tight association to prevent this.

One of the few new techniques in essential-oil production has been the use of liquefied butane to extract flower oils. P. Robertet has pioneered this closely guarded procedure—it is the only way known to get natural Lily of the Valley essence, for example.

These old techniques add to the cost, limit the amounts of perfuming agents. More than one U.S. firm has been forced to turn to synthetics because total yearly essential-oil production of a certain type isn't enough to fulfill its demands.

Generally, the U.S. perfume industry has come through with low cost, usable materials, and it has gone out of its way to seek new outlets for odorization agents. Perhaps, in broadening the outlets and lowering costs, industry has stripped much of the glamor from the perfumer's art. But it has literally boosted sales for the new products, and created a mellower atmosphere for the consumers.

Fertilizer Contender

Calunite, an alunite-based fertilizer, will be put on the market next month by Calunite Corp., Altadena, Calif. The company's claim: a greater crop yield (up to 53%) from most soils for about half the cost of standard N-P-K fertilizers.

The base will be processed in a $175,000, 20-tons/day mill at Marysvale, Utah, then shipped to regional mixing plants to be fortified with nitrogen and phosphorous. The company expects to have mixers and dis-

Specify HYDROFOL GLYCERIDES T-57-N

(Hydrogenated Tallow)

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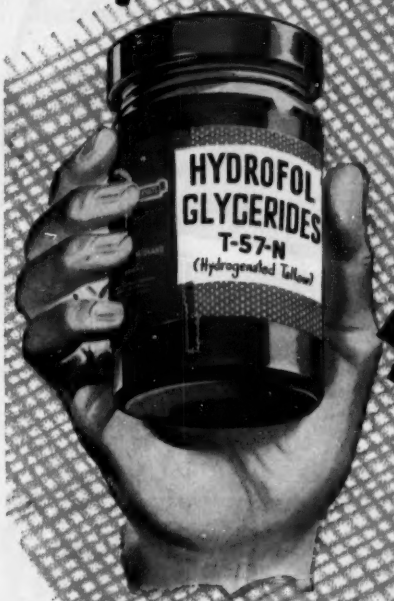

HYDROFOL T-57-N is a superior glyceride with an extremely low free fatty acid content. It is perfectly suited to the manufacture of sizes, finishes, softeners, and other textile chemicals. If you have been searching for a hydrogenated tallow with low iodine value, pure white color . . . a tallow that will not turn rancid . . . write for a sample of HYDROFOL T-57-N today. Excellent, too, for Hot Melt Adhesives and Japan Wax replacements.

SPECIFICATIONS

FFA Max. as Oleic	0.5
Acid Number	1.0 Max.
Saponification Value	193-198
Iodine Value	1.0 Max.
Titre °C	57-61
Melting Pt. °C	59-64
Color Max. (5¼ inch Lovibond)	10Y-1R

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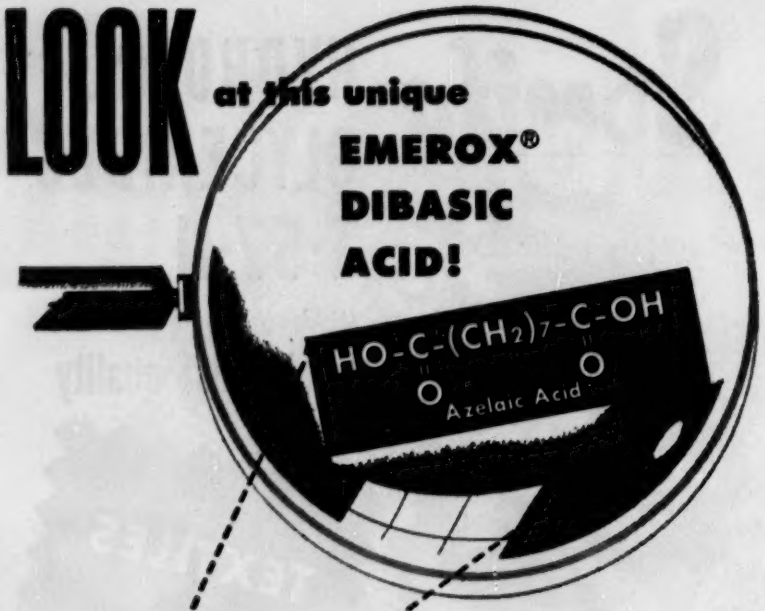

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Take a look at the typical characteristics and composition of EMEROX 1110 Azelaic Acid:

Acid Value	560
Combining Weight	100
Melting Point	95-99° C
Color, F. A. C.	7
Specific Gravity @ 110° C	1.038
Azelaic Acid Content (C_9)	87%
Other Dibasic Acids	13%

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tribution centers in Los Angeles, Little Rock, Ark., and Stockton, Calif., by mid-August. Capacity: 6,000 tons/month.

Output is scheduled to be doubled by the end of the year via the addition of mixing facilities at Congerville, Ill., Greenville, Miss., and St. Louis.

The company has lined up, through leases or purchases, alunite reserves approximating 34 million tons—much of it in the vicinity of Marysvale.

Alunite was used in World War I as an agricultural potash substitute. According to Calunite, its deposit contains these fertilizer-useful elements: boron, calcium, copper, iron, magnesium, manganese, molybdenum, potassium, sodium sulfur and zinc.

Glassy Concrete

A new ceramic-glazed concrete block, Glasface, is being turned out by the Ferro Corp., Cleveland. According to its maker, this marks the first time a glassy finish has been applied successfully to a concrete block at a reasonable cost without impairing the structural strength of the concrete.

The blocks can be made in a range of colors as well as in various types of finishes, including mottling and stippling. Tests indicate that while a slight loss of crushing strength is produced during the firing of the block, the final figure is still above the ASTM specification for a Class A block; that the block can stand a hydrostatic pressure of 15 in. of water on the reverse side without showing signs of peeling.

The company plans to license the process on a royalty basis. Equipment for a complete plant for glazing concrete blocks can be installed for around $50,000. Capacity: 700 glazed blocks per 24-hour day at an approximate cost of 30¢ each.

•

Medical Technique: Arner Co. (Buffalo) has come up with a way to apply its pharmaceutical manufacturing techniques to optical lens grinding. The drug firm is now making pitch rings, used to hold lens blanks in position, in same type compressor used to make tablets. American Optical Co., using the rings, formerly made them in individual molds.

•

Polystyrene Lacquer: Schwartz Chemical Co. (New York) now sells a lacquer to permanently adhere to high impact polystyrene. Rez-N-Lac 475 achieves the job by altering the polarity of the polystyrene surface,

the company claims. It's available in clear as well as transparent and opaque colors.

•

Orlon Top: Ever-Dry Corp. (Los Angeles) has added an Orlon pad to its squeeze-bottle-packed deodorant Ever-Dry. The company says the new feature prevents wasteful application. Price: 6-oz. bottle, $1.

•

Car Kit: Color-Pak (Summit, N.J.) offers a kit with paint, brushes, polishing compound to refinish spots and nicks on autos. Buyers supply make, year and color of car and get the proper kit in return. Cost: $1.50.

•

No Flash Flame: Paul Reed Co. (Mission, Kan.) is marketing an igniting fluid for outdoor charcoal grills. It sells for 99¢/qt. can.

•

Casting Resin: Emerson & Cuming, Inc. (Canton, Mass.) has brought out a new casting resin for embedding power transformers and transistors, as well as complete electronic circuits. The product, Stycast 2850 GT, has a low thermal coefficient of expansion. Other properties: good adhesion, room temperature cure.

•

Agents: Alexander M. McIver & Son, broker in Charleston, S.C., has been appointed by the Chicago Fertilizer Co. as its exclusive sales agent for Vitorganic-Chicago Activated Sludge, which is made by the Sanitary District of Chicago.

•

Standardization: The Naphthenate Preservatives Institute has begun standardizing methods of analyzing both solution strengths and impregnations of wood by naphthenate preservatives. Aim: to increase farm and home applications.

•

Plastic Pipe Sealant: A gasket-sealing compound long used in auto maintenance and the plumbing industry has been found effective in sealing plastic pipe joints, according to the Permatex Co., Inc. (Brooklyn). The product, known as Permatex Form-A-Gasket No. 2, sets slowly, is nonhardening.

•

Improved Light Stability: Dow Chemical Co. has developed a new formulation of polystyrene (Styron 647), which is said to offer eight to ten times greater light stability than the general-purpose polystyrene. Stabilization of the product results in nonyellowing crystal and white colors.

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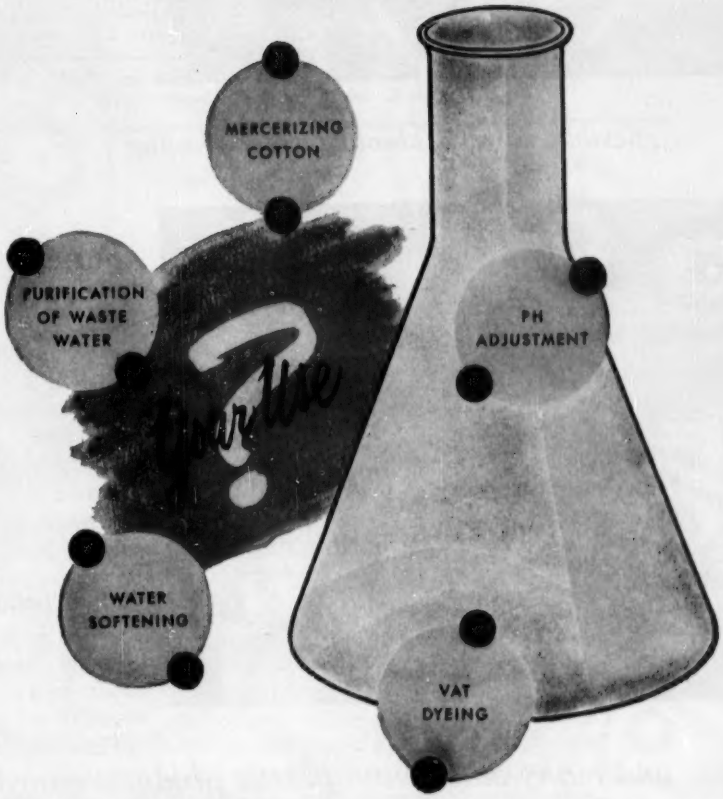

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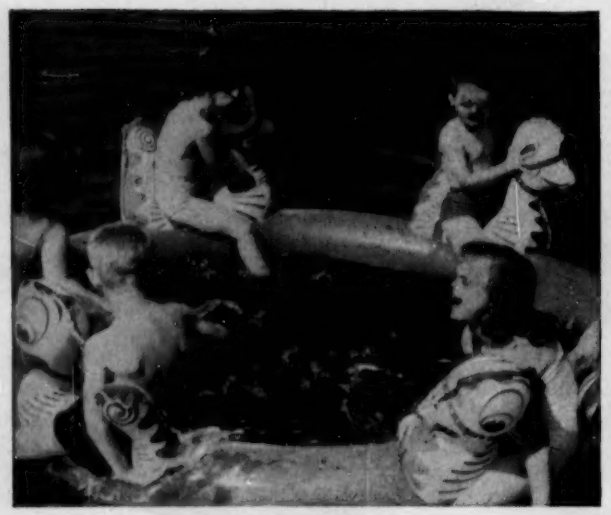

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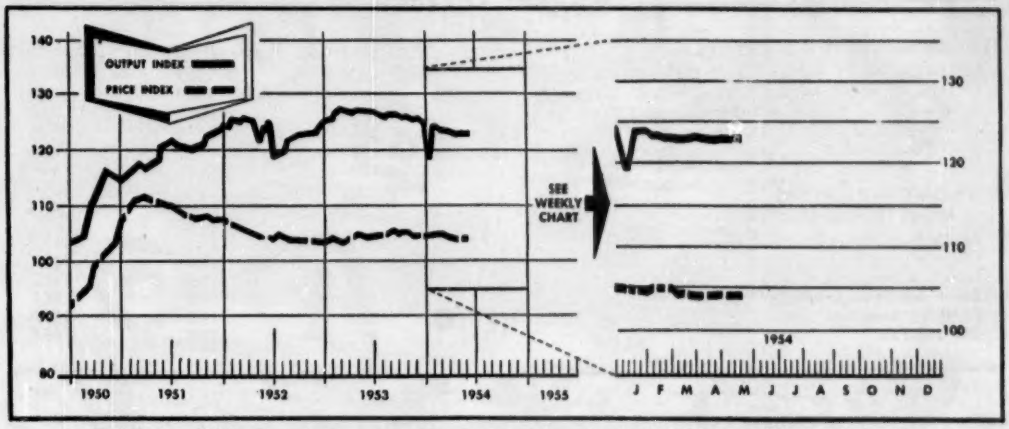


CW Index of Chemical Output—Basis: Total Man Hours Worked in Selected Chemical Industries
CW Price Index—Basis: Weekly Prices of Sixteen Selected Chemicals

MARKET LETTER

Resin business, on the whole, is maintaining a somewhat better than expected briskness. So much so, apparently, it may well be the reason behind Reichhold Chemical's decision to boost phenolic resins (for shell molding) by 2¢/lb. (truckloads) late last week.

The move is officially described, though, as a "step toward a realistic price structure." Reichhold, too, bluntly states a truism—that it is unhealthy for a company to sell "below cost," as has been the practice in the (phenolic resin) field recently.

That being the case, of course, there seems to be little doubt that other producers will find it expedient to follow Reichhold's suit. Hence, foundry resin users may generally be paying a higher 26¢/lb.

•

Price tags on fertilizer materials, however, remain pegged, despite a marked slackening in demand engendered by the present "in-between" farm buying period. The seasonal relaxation has hung a "long" label on anhydrous ammonia, for example.

And ammonium sulfate is also undergoing a current marketing metamorphosis from the tight conditions prevailing just a couple of months ago (CW, Market Letter, May 29). Easing domestic demand, in some cases, has definitely braked output.

Producers, however, are eyeing an upcoming government request for some 20,000 tons, which will be slated for delivery to Korea during September and October. India, too, is said to be in need of about 50,000 tons of ammonium sulfate before the middle of September. Reports are that the U.S. Technical Cooperation Administration has already been approached for help by that country.

•

By this week there's more anhydrous ammonia hitting the market. A spanking-new Atlantic Refining synthetic ammonia unit at its Philadelphia refinery has just begun turning out anhydrous material at a rate that could eventually reach some 100 tons/day.

About 60% of the output will be headed for various industrial outlets; the balance will be sold at agricultural counters.

MARKET LETTER

WEEKLY BUSINESS INDICATORS	Latest Week	Preceding Week	Year Ago
CHEMICAL WEEK Output Index (1947=100)	123.3	120.7	125.9
CHEMICAL WEEK Wholesale Price Index (1947=100)	104.2	104.1	104.8
Bituminous Coal Production (daily average, 1,000 tons)	1,200.0	1,068.0	1,526.0
Steel Ingot Production (1,000 tons)	1,538.0 (est.)	1,557.0 (act.)	2,087.0
Stock Price Index of 13 Chemical Companies (Standard & Poor's Corp.)	324.5	329.0	244.2

MONTHLY INDICATORS Index 1947-1949=100)	Latest Month	Preceding Month	Year Ago
All Commodities (Other than Farm and Foods)	114.3	114.5	113.9
Chemicals and Allied Products	106.8	107.1	105.6
Industrial Chemicals	117.2	117.3	119.2
Drugs and Pharmaceuticals	94.0	94.0	93.1
Fertilizer Materials	111.6	114.0	110.6
Oils and Fats	55.7	59.3	46.6

General Services Administration, getting ready to do some mercury shopping (see p. 67), has some definite ideas how, when, and where it wants the material delivered. Here are some additional details of the stockpile-buying program:

- GSA will acknowledge notices of desire (from all sellers) to participate in the program, providing that these are received no later than June 30, '55. (Sellers are cautioned, however, not to forward any material until specific shipping instructions have been issued.)
- Prime virgin mercury—99.9% chemically pure—that is "clean and bright" will be accepted in minimum lots of five flasks.
- Mexican mercury producers who want to help fill GSA's basket are advised to get in touch with the regional director in Dallas, Tex. (A depot in El Paso is designated to receive all such metal bound for the States.)

Government inspectors will examine the mercury arriving at the various depots, will make the final decision as to whether or not the metal meets government specifications. Rejected shipments must be removed at the seller's expense.

•

The current stratospheric mercury price is having some effect in the paint material market. Last week, for instance, red vermilion was boosted 30¢/lb., thus establishing a new price for the color at $4.90/lb.

Paint makers agree that business during the past several weeks has been pretty good for most dry colors. Chances are, though, that the hot weather—already checking painting operations in a few areas—heralds a more general seasonal slowdown.

•

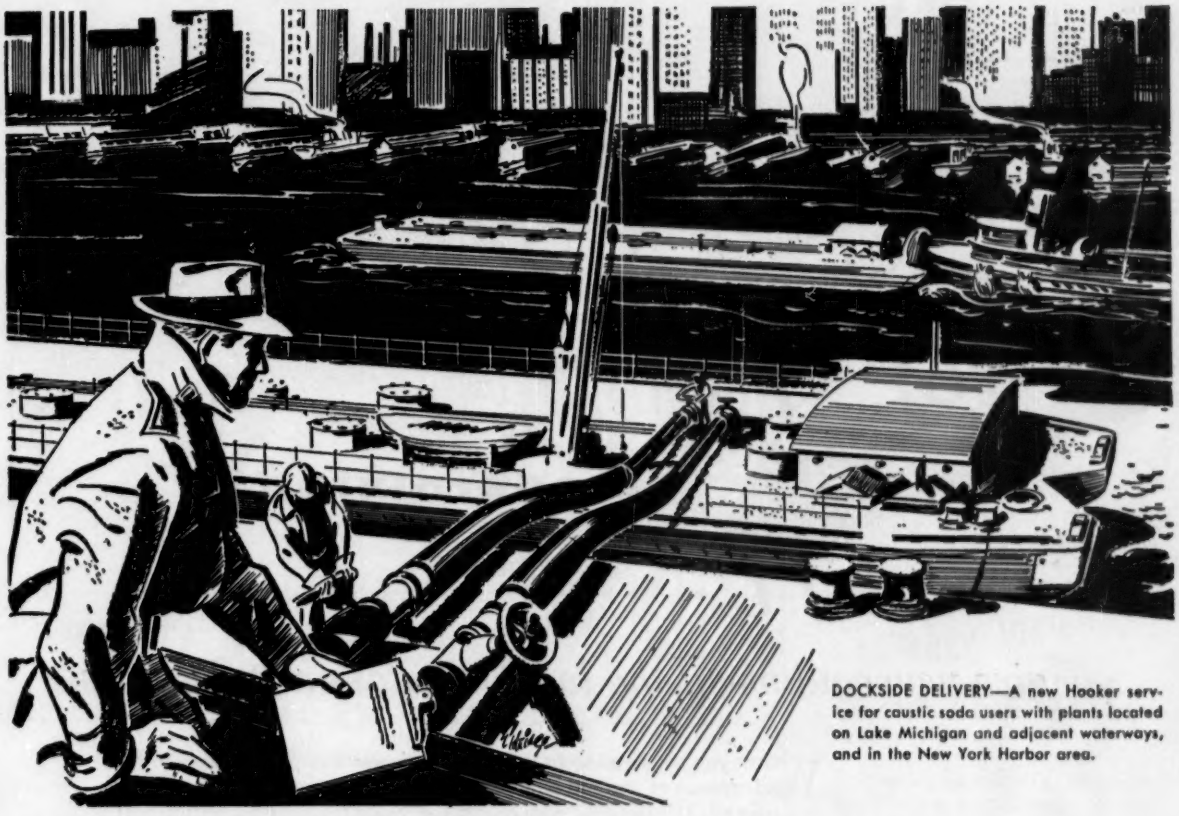
Caustic soda liquor demand, too, is on the verge of a seasonal breather. That may be one reason producers, while not scrambling for business, are evincing more than a modicum of interest in the N. Y. Chemical Procurement District's request for some 8.6 million lbs. of 50 per cent material. Bid opening is Aug. 4; quantity will cover Rocky Mountain Arsenal requirements for a year.

SELECTED CHEMICAL MARKET PRICE CHANGES—Week Ending July 26, 1954.

UP

	Change	New Price		Change	New Price
Mercury, metal, 76 lb. flask	$3.00	$293.00			
Shellac, bleached, bone-dry, bgs., 1,500 lbs. lots	.02	.56	Tallow, bleachable, fancy, tks., dlvd.	$ .0025	$ .06375

All prices per pound unless quantity is stated.



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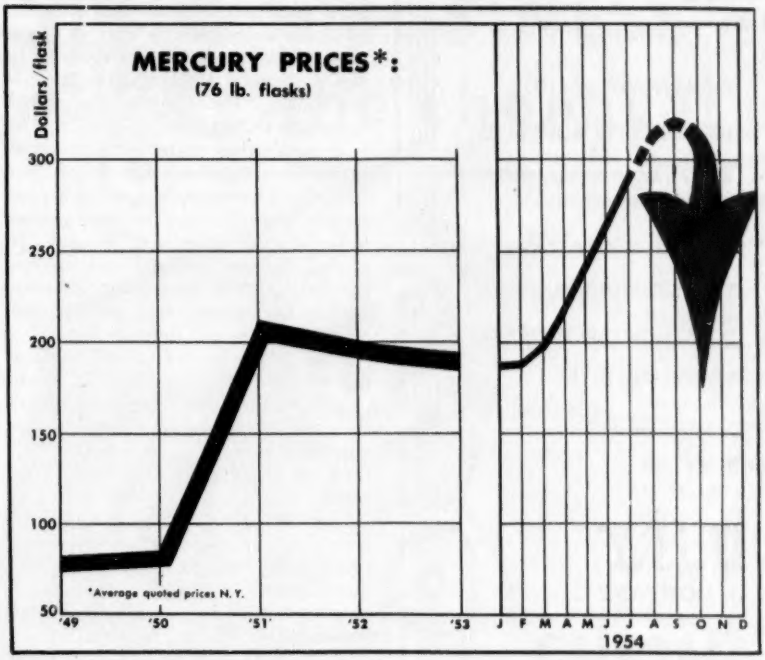

CURRENT PRICES: Jet-like zoom due for a plummet?

Mercurial Is the Market

By this week the situation in mercury (quicksilver), to quote an avid market follower, has become "ridiculous." Prices, for example, have soared to fantastic heights; some sales are currently being noted at a record level of $290-$295/flask—and the possibility of $300 mercury daily approaches reality.

Despite the willingness of a few desperate consumers to pay that kind of tariff, however, the fact is that mercury supply is still as tight as a dowager's shoe. But though there's little immediate easing in view, chances are there'll be a sharp reversal in the now-skyrocketing mercury price along about early fall (*see chart*).

It's pretty well established, of course, that the U.S. government's pre-emption of most of the mercury on the market is behind the somewhat surprising and comparatively sudden shortage. And although the reason for such hectic siphoning is lost in a morass of secrecy and speculation, there's no doubt it has all but elbowed many industrial users right out of the market.

Now, perhaps because of the prolonged wails of distress, the government, via General Services Administration, has come up with a plan, which, if it works, may well do the apparently impossible—stimulate output and, at the same time, knock the price down to within reason.

The GSA program: to buy some 200,000 flasks of domestic and Mexican mercury at a ceiling—or floor, depending on how you look at it—of $225/flask (*CW Market Letter, July 17*). The purchases, 125,000 flasks of U.S. metal, 75,000 flasks of Mexican material, will be made until this quantity has been obtained or until the deadline date Dec. 31, '57.

Duty, amounting to $19/flask, in the case of the Mexican mercury, will be paid by the vendor.

Buying Conditions: Last week GSA detailed further the how, when and where of the latest mercury procurement program. Under the regulations, those who desire to supply the strategic metal must signify their intentions to do so in writing, or by telegram, to the regional director of GSA having jurisdiction over the area where the material originates. (*Also see Market Letter, p. 64.*)

In addition to the domestic and Mexican buying, GSA also indicates it may enter into individual contracts with specific foreign mercury producers, particularly those located in Canada, but all the foreign metal will be bought on the basis of $225 less duty.

GSA administrator Edmund Man-

. . . when WAX is the PROBLEM!

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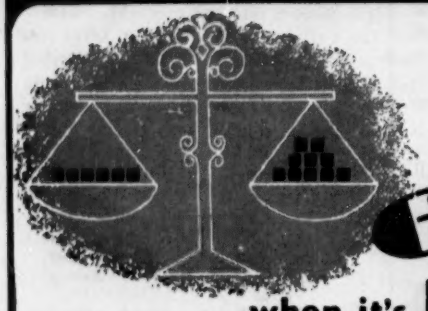

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sure emphasizes, however, that the program is designed to "encourage expansion and production of mercury in the continental United States, including Alaska." He also issued a special invitation to "small producers."

In a further statement, Mansure ostensibly pinpoints the reason behind the government's opening a protective umbrella over hesitant potential producers. "Mercury," he said, "is a vital defense material and an expanded, healthy producing industry within our shores will be another strong point in our defense armor."

Even in the face of today's swollen prices and the crying need of hard-pressed consumers, many marginal domestic operators have been reluctant to reopen high-cost mines. Why? Fear of a sudden and drastic price break.

The new government "guaranteed" floor of $225/flask, however, will likely prove a big enough incentive to lure these apprehensive U.S. and Mexican operators back into production. The reason is twofold:

- The price will apply to long-term government contracts and not to spot purchases.
- Although $225 is well below the current world quote, it is attractively above average prices of recent years. In 1951, for instance, the average New York price was $210; in '52 it figured out to about $200/flask. Last year the price ranged from $183 to $217, averaging to approximately $193/flask for the 12-month period.

Although Washington officials aren't saying it, it's a cinch the new GSA tag will pressure world prices down to its own $225 level. For the plan, as it stands now, inflexibly precludes U.S. buying of Italian, Spanish, Yugoslavian, and other foreign offerings at existing high prices. This country is, and has been, the world's big-time mercury taker—the "residual" buyer. Last year, it picked up about 52,000 flasks out of a total world output of some 161,000.

Puzzling Posers: Since—and for several weeks prior to—GSA's announcement of the 200,000 flasks-in-three-years goal, mercury marketers have been seeking answers to a number of pertinent questions. Most petulant poser raised by aggravated industrial users when Uncle Sam was sweeping the mercury counters (and, incidentally, setting the price on its upward spiral), was: Where is all the mercury going?

A couple of weeks ago, McGraw-Hill's authoritative *E&MJ Metal & Mineral Markets* had this to say:

"Washington officials are close-

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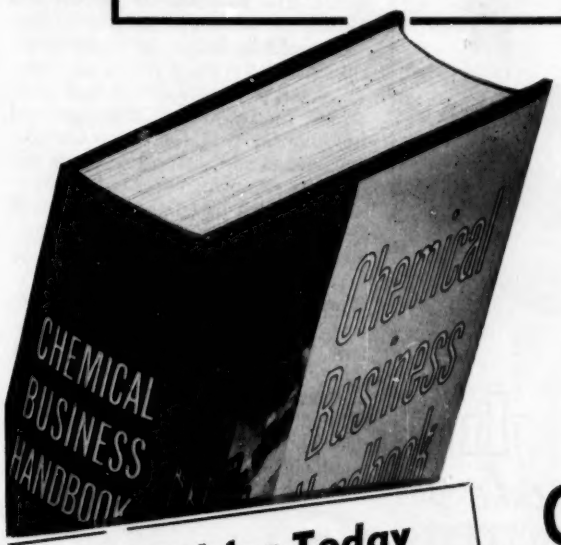
Prepared by a staff of specialists under the direction of John H. Perry
Editor, CHEMICAL ENGINEERS' HANDBOOK



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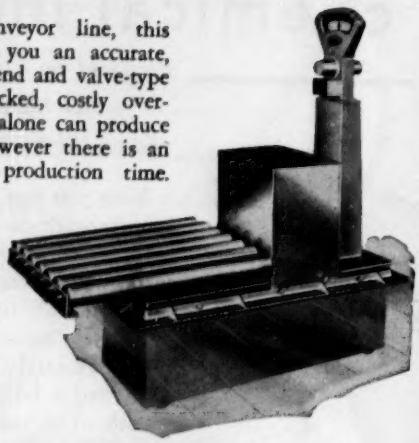

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mouthed about what the government is doing with all the mercury it has acquired since last fall. Some observers contend that the liquid metal is being procured for the atomic energy program; others say this is only a guess. The confusion is endless and already mentioned as possibilities are: (1) could be barter in payment for shipments of grain to Italy and Spain; (2) smart purchases with stalled counterpart funds; (3) to keep the metal from flowing behind the Iron Curtain; (4) add to the stockpile because the metal is strategic; (5) some mysterious new uses; or (6) as a heat-transfer medium in nuclear reactors; and finally (7) politics."

Other rumors, of course, serve to counter those, further confuse the picture. For instance, widespread trade talk concerning the stockpile is that the goal was filled long ago—probably back as early as 1950; and that at the moment the U.S. strategic reserve contains about twice as much mercury as originally planned.

Another is that mercury as a heat-transfer medium in nuclear reactors has been tried and found wanting.

Of more current interest than the question of where the mercury has gone, is this query: Where will the 200,000 flasks just asked for come from? That amount is far in excess of current domestic output, which is now running at about 14,000 or 15,000 flasks/year. Mexico, too, is producing at about the same clip. Thus with Spain and Italy excluded (their combined exports to the U.S. last year totaled more than 66,000 flasks), the U.S.-Mexican potential production through 1957 would hit only some 90,000 flasks. Add, too, the fact that the U.S. is consuming mercury at a 52,000-flasks/year rate.

On the other hand, there's a good basis for an even bet that GSA will get all the mercury it's looking for. A glance at a few mercury statistics reveals that during the World War II period U.S. and Mexican production reached levels that, if they can be repeated, would more than amply supply the 200,000 flasks. In 1942, this country turned out about 50,800 flasks; Mexico, some 30,000. By the following year production hit a peak in both countries—51,900 flasks for the U.S.; 31,000 out of Mexico, and at a price that was slightly less than $200/flask.

Then, too, just the likelihood of Western Hemisphere self-sufficiency may be enough to bring other world sellers around to a lower price.

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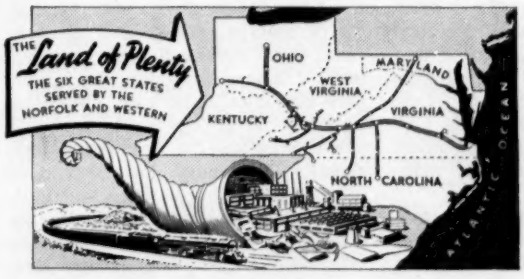

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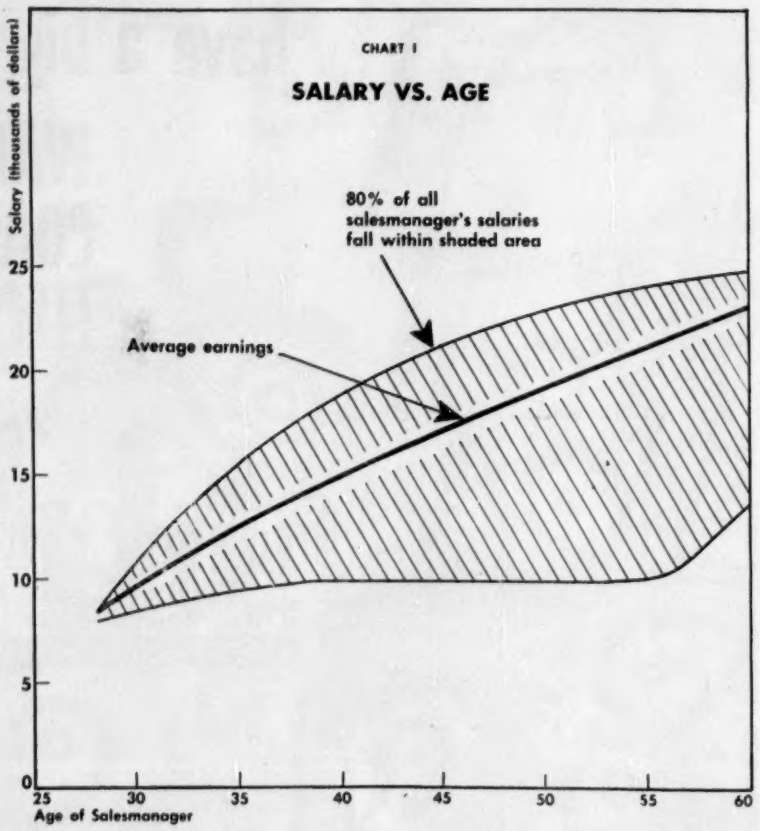

Profile, Chemical Sales Boss

More so now than within the past 15 years, the responsibility for a chemical company's welfare rests on the abilities of its sales manager.

Critical marketing functions—sales campaigns, sales force recruitment, price policy—all pivot to a great extent on his knowledge and know-how. And with competitive markets at every stop on the road, it's no small wonder that the top-flight sales manager commands a good salary.

Within recent weeks, CW has completed a poll of the membership of the Salesmen's Assn. of the American Chemical Industry, Inc. Tape-measured by the survey: income; educational and industry background; and the frequency and duration of the time spent calling on accounts.

In working out the final totals, CW found that 60% of SAACI's members classified themselves as sales managers.

For guiding the destinies of his company's sales, the average sales manager earns a tidy $15,500/year compared with the $9,100 mean (*see CW, July 17, '54 p. 89*) of the salesman. Further emphasizing the differential: although 60% of all salesmen drew between $7,000-$11,000/year, over 60% of all managers earned better than $12,000. And consistent with the premium for administrative responsibilities about 22% of all sales managers were paid more than $18,000/year.

Background: Most sales managers, like salesmen, entered the chemical business within a few years of their early twenties. But unlike the salesman, a degree makes a difference in the percentage time spent in chemical sales; those without degrees have put 92% of their chemical industry experience into sales; those with, 78%. The bulk of the college-man's time not spent selling was chiefly in production, research, to a much lesser extent in other technical and business functions.

Difference of Degree: By and large, a technical education has done somewhat more for the sales manager than

The Model of an Average* Chemical Sales Manager . . .

- draws a salary of $15,500/year; about 45% of all sales managers make between $12,000 and $19,000 (inclusive) a year.
- has spent 19.2 of his 43.2 years in the chemical industry; 49% all reporting are older than 35 but younger than 46; some 46% have been in the chemical industry between 16 and 25 years (inclusive).
- can claim 15.9 years of his career in chemical sales; 43% have worked longer than 12 but less than 26 years in sales.
- was in chemical production for a year, research for about six months; 49% have never worked in either.
- 50-50 chance that he possesses a technical degree; of those with degrees, 14% are BA's; another 14% have graduate diplomas.
- belongs to 2.4 trade associations (including SAACI); 74% pay dues to at least one other trade society.

***Based on sales manager replies to a poll of the membership of The Salesmen's Assn. of the American Chemical Industry, Inc.**

it has for the salesman and of the 52% who earned technical degrees, the average man in any age bracket earned more than the nontechnically trained. Here is a breakdown on a years-in-sales basis:

Average Salary of Sales Managers (in thousands)

Years in Sales	BS	Non-BS	All
0-5	12.1	—	12.
6-10	12.9	11.6	12.4
11-15	13.9	12.8	13.5
16-20	16.8	17.1	16.9
21-25	17.5	13.7	14.5
26 and over	27.8	22.	23.6

Although the same trend is clearly reinforced when the age-brackets substitute for years-in-sales brackets, a contradiction pops up when years-in-chemical industry is substituted; the pattern reverses in two categories. Furthering the disparity: the average nondegree sales manager earns about $500/year more than the campusite.

But, when viewed in the perspective of age distribution, the seeming disparity loses significance. The rationale:

- In each of the groups, the percentage of older sales managers was higher among those without degrees.
- Sales managers in upper age brackets earned more than those in lower categories.
- The average manager without a BS is five years older, has labored 6.4 years more in the chemical industry, than his college contemporary.

Older sales managers strongly dominate the group without university schooling. Some 72% are over 40, 28% are over 50. Year by year, the age pattern falls out this way:

Age Distribution

	BS	Non-BS	All
Under 30	5.4%	—	2.8%
31-35	17.5	10.2	14.0
36-40	40.5	17.4	29.4
41-45	14.8	24.6	19.6
46-50	9.5	20.3	14.7
51-55	8.1	10.1	9.1
56 and over	4.1	17.4	10.5

Coupling the large proportion of non-BS men with the fact that compensation mounts with managers' age, the reason for the lower average salary of the degree man stands out:

- The higher relative percentage of the nonuniversity men push their over-all salary average above that of sales managers who have advanced training.

From a glance at the table, the heyday of the nontechnically trained sales leader appears to be ebbing. In the lower age brackets, representing

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43% of all managers, the BS men far outnumber those who haven't been to college.

Of the sales managers replying to CW's queries, about a third signified they still "make the rounds." But indicative of their added chores, they can find time to call on "good" accounts only 8.2 times/year; on "average" accounts, 5.8 times/year.

And, the pressures of his position slice sharply into the time a sales manager devotes to accounts. Possibly indicative of his long years in the industry and more established relationships, the nondegree man averaged 3.1 hours per client while the technical sales boss spent 2.7. Over-all, 79% of all chemical sales managers stayed 2 to 4 hours with each customer.

Again reflecting his responsibilities, the average manager makes a determined effort to catch the tempo of his trade. Revealed by the survey: degree or not, sales managers belong to considerably more business associations than salesmen. The average degree-holder attends meetings of 2.6 societies; those without, 2.1. Better than 30% of all managers belong to three or more; only a third are SAACI members exclusively (see chart IV).

What associations do sales managers join? By SAACI membership, the answer works out this way:

Percent of Membership

Trade Society	BS	Non-BS	All
American Chemical Society	62.4	22.7	43.2
Commercial Chemical Development Assn.	17.1	2.7	10.2
Toilet Goods Assn.	6.1	14.7	10.2
Chem. Specialties Mfr.'s Assn.	11.0	13.3	12.1
Other association membership (mentions)	37.7	30.7	35.0

Statistical Scatter: Similar to its salesmen's survey, CW's once-over of the "boss" picked up wide fluctuations. One example: despite 30 years in the industry, one old-timer was far below his age group, drew only $10,000/year. At the other end of the scale, however, one 33-year-old sales manager with but seven years' experience earned $21,000/year.

Vagaries of statistical averages and assay's notwithstanding, this much is clear: the chemical industry matches its sales manager's salary to his responsibility, pays a premium for long experience, pays more for a college degree, and is swiftly trending to the man with a technical background.

CHART II

Salary Distribution of Chemical Salesmanagers

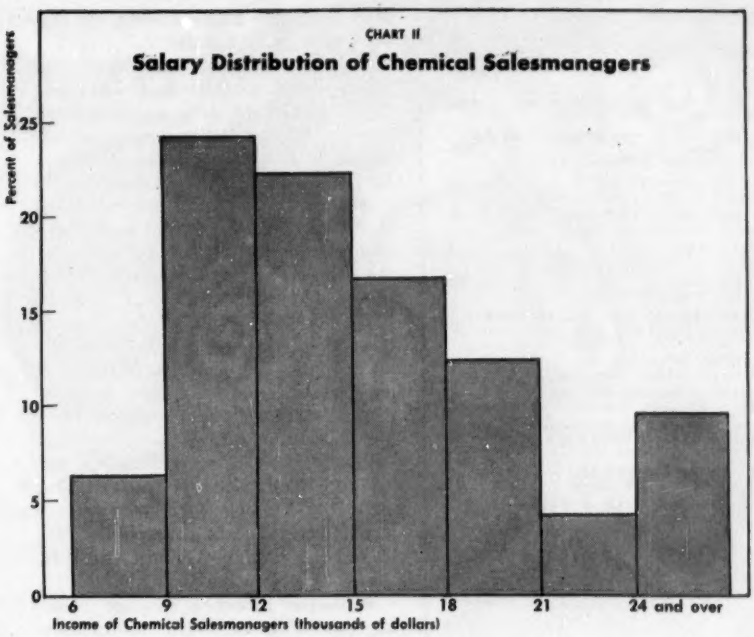
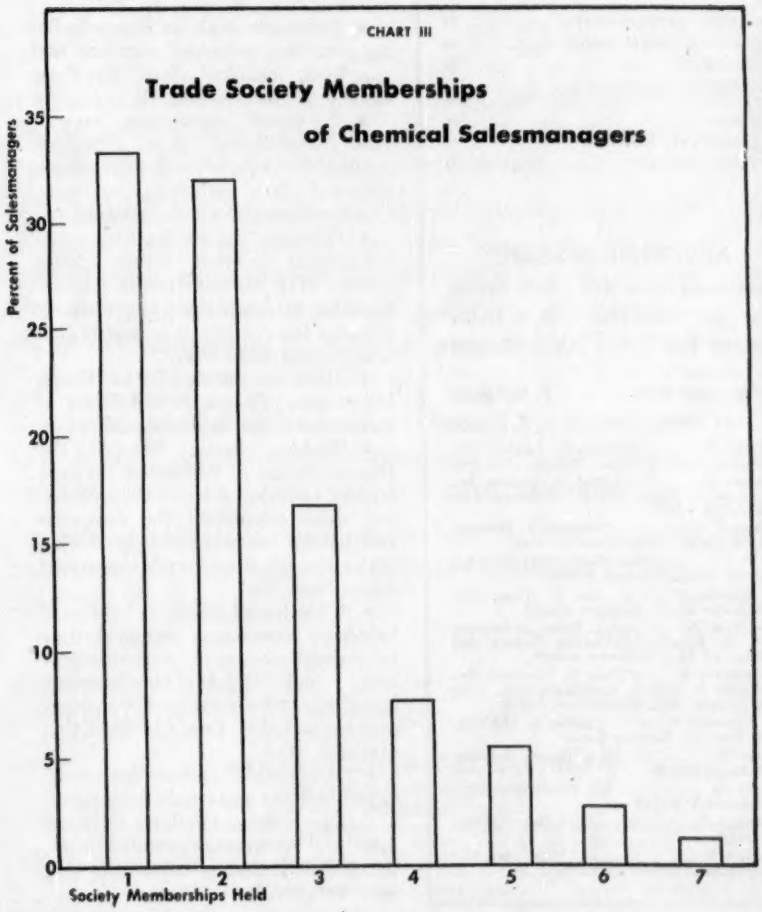


CHART III

Trade Society Memberships of Chemical Salesmanagers



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• Inorganic-based protective coatings for metals—an 8-page leaflet providing selection charts for matching the correct coating to surface. American Chemical Paint Co., Ambler, Pa.

• "dag" dispersions—a 4-page list of graphite, vermiculite, zinc oxide, and molybdenum disulfide colloidal dispersions in carriers varying from water to epoxy resin solutions. Examples of possible applications are also provided. Acheson Colloids Co., Port Huron, Mich.

• Extracted plant principles—a leaflet listing products of the Karl B. Rosen Co., New York.

• Textile Fibres—a 20-page booklet providing technical information and potential applications for rayon, acetate, nylon, Orlon, Dacron, and Teflon fibers. E. I. du Pont de Nemours & Co., Wilmington, Del.

• Barbituric Acid—an 8-page bulletin itemizing principal reactions and supplying technical data. Kay-Fries Chemicals, Inc., New York.

• "Ty-Bond" amorphous, crystalline, nonsludging zinc phosphate coatings—a 4-page leaflet providing technical data and suggested uses. Cowles Chemical Co., Cleveland.

• "Metalife" photo-sensitive coating process for offset "surface" plates—Army Map Service Bulletin No. 32. Explains in detail operating methods of using the coating. Sun Supply Co., Long Island City, N.Y.

• American Bio-Synthetics Corp., Milwaukee, offers a revised listing of its products, specifications, and prices.

• "Making Better Use of the Human Factor in Selling"—a 32-page booklet covering sales force revitalizing, sales orientating the company, and mental measurement. Marketing Series No. 93, American Management Assn., New York.

• "Chlorinated Benzenes"—14 page handbook containing technical data for *o*-dichlorobenzene, *p*-dichlorobenzene, and 1,2,4-trichlorobenzene. Handling precautions and suggested uses are included. Dow Chemical Co., Midland, Mich.

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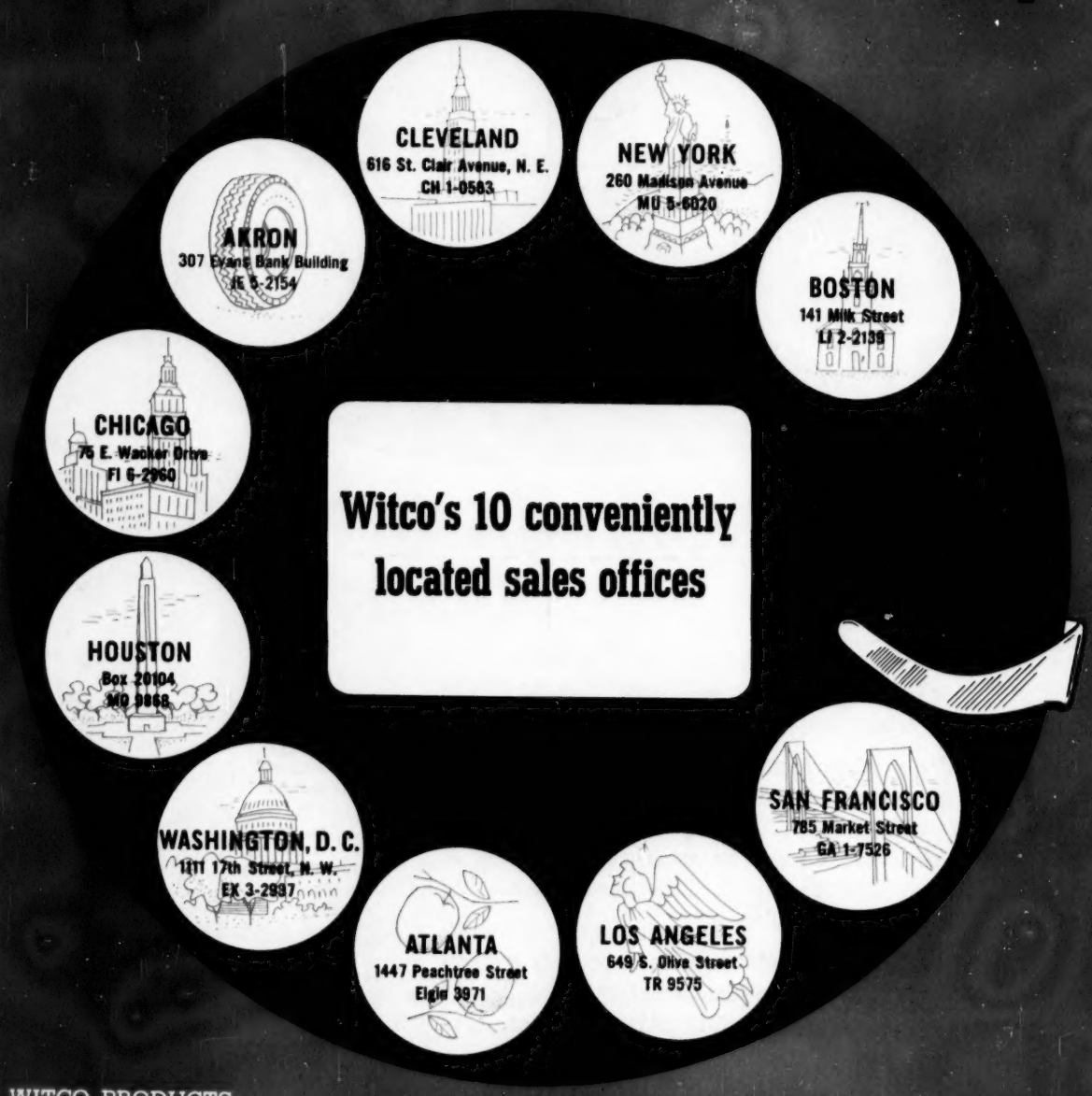

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